

Creative Computing®

the #1 magazine of computer applications and software

HP 110



Macintosh

In-Depth Evaluations:

- NCR Decision Mate V
- HP 110 Notebook Computer
- Macintosh
- Sweet-P Plotter
- Roland Plotters
- Apple Mouse
- Turbo Pascal
- The Print Shop
- B/Graph
- VU-3D For TS2068
- Educational Software

Choosing And Using A Business Graphics Package

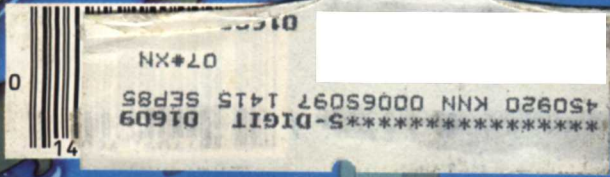
Structured Programming In Basic

Plotter/Graphics Tutorial

Mathematics And Computer Art

Focus on Graphics

year Dady © 84



Tecmar Sweetens Macintosh® with Hard Disk Power

Mac Drive™

Tecmar's Mac Drive gives you a 10 megabyte fixed hard disk or a 5 megabyte removable hard disk. You can add a 5 megabyte removable hard disk to either of the above.

With Tecmar's Mac Drive . . .

- Your Macintosh runs much faster than with the built-in floppy.
- Mac Drive will provide up to 38 times more storage than floppies.
- You can minimize the use of floppies.
- You can access files and save time by loading programs from Mac Drive.
- You can take your removable Mac Drive cartridge with you for added security.



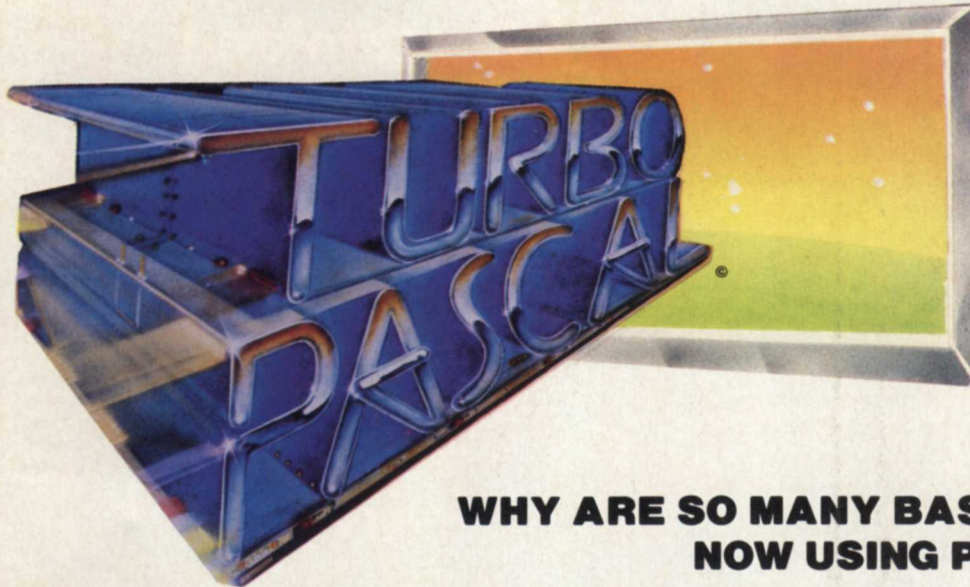
TECMAR
Tecmar Sweetens Apples™

Tecmar Inc. 6225 Cochran Road Solon (Cleveland), Ohio 44139-3377 Phone:(216)349-0600 Telex: 466692

CIRCLE 176 ON READER SERVICE CARD

"Borland's Turbo Pascal is a giant step in the right direction."

Jerry Pournelle, *Byte*, April, 1984



**EXTENDED PASCAL FOR YOUR
IBM PC, PC Jr., APPLE CP/M
MSDOS, CP/M 86, CCP/M 86
OR CP/M 80 COMPUTER**

**NOW ...
WITH
WINDOWING
(for IBM PC and Jr.)
\$49.95**

WHY ARE SO MANY BASIC PROGRAMMERS NOW USING PASCAL?

Pascal is structured. It's designed not to tangle. What a relief!

Many of us began programming in Pascal because more than once, we'd come smack up against Murphy's first laws of BASIC: GOTOS DON'T and GOSUBS NEVER RETURN!!

You can name variables what you will. Instead of "R", you can call your variable "RateOfSpeed". It makes sense. And its modular structure allows for the greatest ease of program maintenance.

Of course, some of the new BASICs have variations of these features, but, as anyone who's ever tried to write a game in BASIC knows, it's an awfully slow language in execution. Programs written in Turbo Pascal run many times faster!

If you're wondering why BASIC has overshadowed Pascal until this year, the answer is really quite simple. BASIC, as I'm sure most of you know, comes "bundled" with almost every microcomputer. It, therefore, became the "default" language.

In the past, to convert to a usable Pascal was, at the very least, an expensive proposition.

Our predecessors were costly (\$300-\$900), occupied huge amounts of disk space, and most required a separate editor. It's no wonder BASIC predominated for so long.

Therefore, until the introduction of Turbo Pascal, this powerful language remained a language of professionals.

Now ... with the advent of Turbo Pascal ... Pascal is a language for everyone who programs. It comes with a built-in editor, occupies only 33K of your precious memory and is menu-driven for true programming ease.

And Turbo Pascal compiles up to 97 times faster than any other Pascal compiler around! Yet, it offers all the features and extensions you ever dreamed of; even a windowing procedure for the IBM PC!

If you're running a computer with PCDOS, MSDOS, CP/M, CP/M86, or CCP/M86, give yourself a treat ... TURBO PASCAL!

As Bruce Webster said in *Softalk IBM* in March 1984,

**"It is, simply put, the best software deal to come along in a long time. If you
have the slightest interest in Pascal ... buy it!"**

**To order your copy of Turbo Pascal 2.0 call:
For VISA and Master Card orders call toll free:
1-800-227-2400 x968 In CA: 1-800-772-2666 x968
(lines open 24 hrs, 7 days a week)**

CIRCLE 109 ON READER SERVICE CARD

CHOOSE ONE (please add \$5.00 for shipping and handling for U.S. orders)

___ Turbo Pascal 2.0 \$49.95
___ Turbo Pascal 2.0 with 8087 support \$89.95

If you have a 16 bit computer with the 8087 math chip—your number crunching programs will execute up to 10x faster!

Check ___ Money Order ___
VISA ___ MasterCard ___
Card #: _____
Exp. date: _____ Shipped UPS

BORLAND
INTERNATIONAL
Borland International
4113 Scotts Valley Drive
Scotts Valley, California 95066
TELEX: 172373

My system is: 8 bit _____ 16 bit _____
Operating System: CP/M 80 _____
CP/M 86 _____ MS DOS _____ PC DOS _____
Computer: _____ Disk Format: _____
Please be sure model number & format are correct.

NAME: _____
ADDRESS: _____
CITY/STATE/ZIP: _____
TELEPHONE: _____

California residents add 6% sales tax. Outside U.S.A. add \$15.00. (If outside of U.S.A. payment must be by bank draft payable in the U.S. and in U.S. dollars.) Sorry, no C.O.D. or Purchase Orders. C-12

Treasure ChestTM of Software

with Tecmar's CaptainTM, JrCaptainTM and 1stMATETM multifunction boards

Your PC can finally do all the wonderful things you've dreamed about — with the Treasure Chest of Software. Eliminate the need for many desk top accessories when you discover Tecmar's new easy to use software technology. With the press of a key you access many Treasure Chest programs without having to exit from a program you are now using. This Treasure Chest of Software gives your PC more power for:

Information Management

- Calculator
- Sorting Program
- Forms Generator - create letters, labels & reports
- Electronic Rolodex*
- Mailing List
- Electronic Notepad

Time Management

- Automatic Appointment Alert
- Calendar Generator
- Automatic Time and Date

System Improvements

- Background Printer - frees PC for other work
- Disk Simulator in RAM

Hardware Diagnostics

- Memory Diagnostics
- Printer Diagnostics
- Clock-Calendar Diagnostics

Information Security

- Confidential File Coding

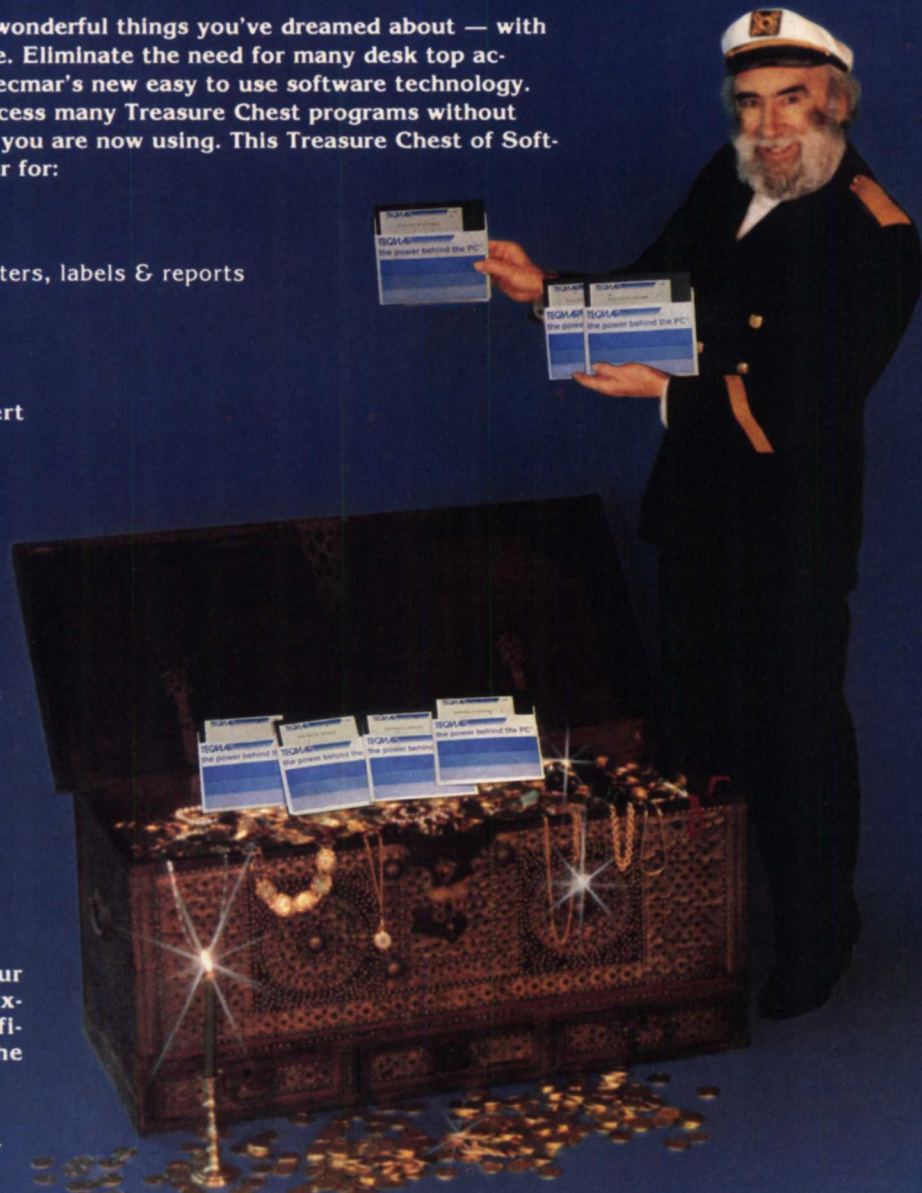
Use at Home

- Checkbook Balancer
- Inventory Management
- Banner Generator - prints letters 4.5 inches tall
- Tic-Tac-Toe
- and more !

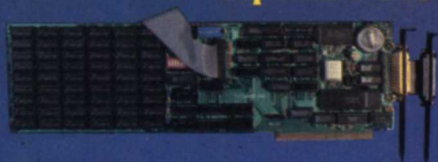
You'll never want to turn your computer off once you experience the ease of use, efficiency and enjoyment of the Treasure Chest of Software.

INTRODUCTORY OFFER

*Rolodex is a trademark of The Rolodex Corp.

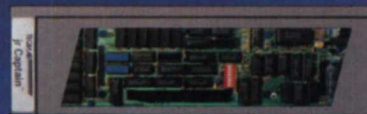


for the IBM PC - Captain & 1stMATE



- 0 to 384 KBytes of Memory on the Captain Board
- 0 to 256 KBytes of Memory on the 1stMATE Board
- Clock-Calendar with battery
- Serial Communications Port
- Parallel Printer Port
- Treasure ChestTM of Software

for the PCjr — the JrCaptain



- 0 to 128 KBytes of Memory
- Upgrade to 512 KBytes with addition of JrCadet Board
- Clock-Calendar with battery
- Parallel Printer Port
- Treasure ChestTM of Software

TECMAR

the power behind the PC

Tecmar, Inc. 6225 Cochran Road Solon (Cleveland), Ohio 44139-3377 Phone:(216)349-0600 Telex:466692

CIRCLE 178 ON READER SERVICE CARD

In This Issue



Evaluations & Profiles

- 12 The Apple Macintosh** Anderson
Peel away the hype and what do you find?
- 27 The Hewlett Packard HP 110** Anderson
An almost perfect portable
- 38 The NCR Decision Mate V** Ahl
A novel 8/16-bit German design
- 46 Apple II Mouse** Arrants
A new way to use the Apple
- 53 Turbo Pascal** Blank
The best costs less
- 57 The Print Shop** Staples
A graphics program anyone can enjoy
- 63 B/Graph** Leyenberger
Business graphics for home computers
- 67 VU-3D For The TS2068** Linzmayer
A poor man's CAD package

Articles

- 108 What's New In Hardware** Arrants and Miller
First impressions of the Apple IIc
- 119 What's New In Software** Arrants
Hayes enters the software market

Applications & Software

- 125 Structured Programming In Basic** Luehrmann
Part 3: An application
- 141 Mathematics And Computer Art** Gordon & Gordon
Part 3: Going around, under, and through circles
- 148 Plotting And Graphics Tutorial** Ahl
The Sierpinski curve: A lesson in debugging and conversion
- 166 The Plot Thickens** Fujimoto
Transformation of Hilbert and Sierpinski curves

Choosing and Using Business Graphics Software

- s2 Types of Business Graphics Software** Keating
- s2 Choosing and Using a Business Graphics Program** Keating
- s8 Comparison Chart of Business Graphics Programs** Keating
- s15 Directory of Business Graphics Products** Keating
- 100 Growing Up Literate** Staples
Spell Diver, Attack of the Spelling Bees, and Word Bird

Departments

- 6 Notices** Fee
- 6 Input/Output** Readers
- 8 Benchmark Results** Ahl
How does your computer compare?
- 170 Plots About Plotters** Ahl
The Roland DXY-800 and Sweet-P plotters in depth
- 182 Commodore's Port** Anderson
Simple animated graphics
- 187 Let's Talk Business** Blanchard
Getting into word processing
- 194 Notebook Computing** Anderson
Book Beat, demo program, and counting words
- 206 Outpost: Atari** Leyenberger & Small
The 1450 XLD is not dead
- 209 IBM Images** Glinert-Cole
New products, CBasic, and the GSX module
- 216 TRS-80 Strings** Gray
A printer, voice, and other new products for Tandy users

Cover: Illustration by Sean Daly.

July, 1984
Volume 10, Number 7

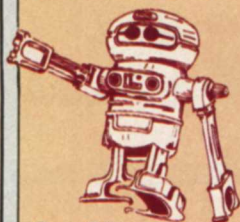


Creative Computing (ISSN 0 097-8140) is published monthly at 3460 Wilshire Blvd., Los Angeles, CA 90010 by Ahl Computing, Inc., a subsidiary of Ziff-Davis Publishing Company. David Ahl, President; Elizabeth B. Staples, Vice President; Selwyn Taubman, Treasurer; Bertram A. Abrams, Secretary. P.O. Box 789-M Morristown, N.J. 07960. Second Class Postage paid at Los Angeles, CA 90052 and additional mailing offices.

Copyright © 1984 by Ahl Computing, Inc. All rights reserved.
Editorial offices located at 39 East Hanover Ave., Morris Plains, NJ 07950. Phone (201) 540-0445.
Domestic Subscriptions: 12 issues \$24.97; 24 issues \$43.97; 36 issues \$57.97.
POSTMASTER: send address changes to Creative Computing, P.O. Box 5214, Boulder, CO 80321. Call 800-631-8112 toll-free (in New Jersey call 201-540-0445) to order a subscription.

Staff

Founder/Editor-in-Chief	David H. Ahl
Editor	Elizabeth B. Staples
Managing Editor	Peter Fee
Associate Editors	John Anderson Stephen Arrants, Jr. Russ Lockwood
Reviews Editor	Paul Grosjean
Editor-at-Large	Ken Uston
Contributing Editors	Will Fastie Susan Gilnert-Cole Danny Goodman Stephen B. Gray Glen Hart Stephen Kimmel Art Leyenberger Brian Murphy Ted Nelson Peter Payack Alvin Toffler
Copy Editor	Sherrie Van Tyle
Editorial Assistant	Laura Gibbons
Secretary	Diane Koncur
Design Director	Brian Day
Art Director	Patrick Calkins
Assistant Art Director	Chris DeMilia
Artists	Diana Negri Rudio Eugene Bicknell Peter Kelley
Typesetting	Karen K. Brown
Publisher	Claude P. Sheer
Creative Computing Press	Laura Conboy
Office Manager	Jennifer Shaler
Administrative Assistants	Joanne Sapio Renea Cole Cross
Retail Marketing	Susan DeMark
Operations Manager	Dan Nunziato
Fulfillment	Francis Miskovich Rosemary Bender Linda Blank Pat Champion Elsie Graff Linda McCatharn Carol Vita Jim Zecchin Diane Moran Barbara Carnegie Lisa Dickisson Maira Cullen Donna Stiefel Cheryl Schauble Valerie Gaddis Mauricio Algarra Craig A. Brown
Shipping & Receiving	Ronald Antonaccio Richard Crawford Andy Dayan Scott Hollendersky David Lewis Tim Segada William Sprouls John Ziegenfuss



Advertising Sales

Publisher
Claude P. Sheer
Creative Computing
Ziff-Davis Publishing Company
One Park Ave.
New York, NY 10016
(212) 503-5011

Advertising Coordinator
Chris Tice
Creative Computing
Ziff-Davis Publishing Company
One Park Ave.
New York, NY 10016
(212) 503-5012

Northern California, Northwest
Jeff Miller
Ziff-Davis Publishing Company
11 Davis Drive
Belmont, CA 94002
(415) 594-2290

Southern California, Southwest
Tom Martin
Ziff-Davis Publishing Company
3460 Wilshire Blvd.
Los Angeles, CA 90010
(213) 387-2100

New England
Merrie Lynch
Nancy Wood
CEL Associates, Inc.
61 Adams Street
Braintree, MA 02184
(617) 848-9306

Midwest
Jeff Edman
William Biff Fairclough
The Patis Group
4761 W. Touhy Ave.
Lincolnwood, IL 60646
(312) 679-1100

Mid-Atlantic, Southeast
Larry Levine
Ziff-Davis Publishing Company
One Park Ave.
New York, NY 10016
(212) 503-5013
(201) 549-6811

Canada
The Patis Group
501 Eglinton Ave. E.
Suite 202
Toronto, Ontario M4P 1N4
(416) 482-6288

Ziff-Davis Consumer Computers & Electronics Magazine Division

President: Larry Sporn
Vice President/General Manager: Eileen G. Markowitz
Vice President Licensing and Special Projects: Jerry Schneider
Vice President Creative Services: Herbert Stern
Vice President Marketing: Jeff Hammond
Vice President Circulation: Carole Mandel
Creative Director: Peter J. Blank
Marketing Manager: Ronni Sonnenberg

Permissions

Material in this publication may not be reproduced in any form without permission. Requests for permission should be directed to Jean Lamensdorf, Ziff-Davis Publishing Company, One Park Avenue, New York, New York 10016.

Where To Send It

All editorial material, including article submissions, press releases, and products for evaluation should be sent to:

Creative Computing
39 E. Hanover Ave.
Morris Plains, NJ 07950

Correspondence regarding other Creative Computing products and publications should also be sent to the Morris Plains address.

Correspondence related to advertising, including ad copy, questions on billing, and requests for rates, should be sent to:

Advertising Department
Creative Computing
Ziff-Davis Publishing Co.
One Park Ave.
New York, NY 10016

Correspondence regarding subscriptions, including orders, changes of address, and problems should be sent to:

Creative Computing
P.O. Box 5214
Boulder, CO 80321

Your help in choosing the correct address for your correspondence is appreciated. An incorrectly addressed letter or package can take as long as several weeks to reach its proper destination.

Subscriptions

All subscriptions orders and other correspondence related to subscriptions should be addressed to:

Creative Computing
P.O. Box 5214
Boulder, Colorado 80321.

Foreign subscriptions must be accompanied by payment in U.S. currency.

Subscription prices:

U.S.	Canada	Foreign
1 year \$24.97	1 year 29.97	1 year 34.97
2 years 43.97	2 years 53.97	2 years 63.97
3 years 57.97	3 years 72.97	3 years 87.97

Airmail delivery on foreign subscriptions is available for a one-year period only at \$75.00 additional for mail to Asia and Australia, and \$50.00 additional for all other foreign.

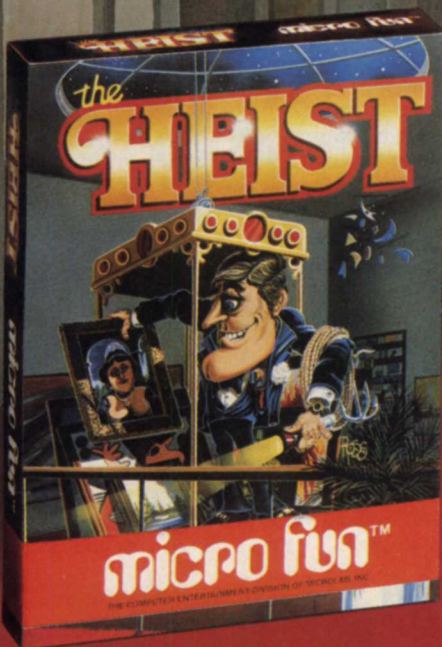
Subscribers in the United Kingdom may send payment in sterling to:

Hazel Gordon
10 Bishops Way
Sutton Coldfield
West Midlands B74 4XU

Please allow at least eight weeks for change of address. Include old address as well as new—enclosing if possible an address label from a recent issue.

Attention Authors

Creative Computing will not be responsible for the return of unsolicited manuscripts, cassettes, floppy disks, program listings, etc. not submitted with a self-addressed, stamped envelope.



The world's fate is in your hands.



Picture yourself as the world's greatest super-agent, Graham Crackers.

You must go undercover and sneak into an enormous art museum. Incredibly, it's a front for an international terrorist organization!

Your secret mission is to heist all the artwork in search of a classified microfilm. If you don't carry it off in time, the world is doomed!

Grab the keys to the 90 fiendishly boobytrapped rooms (144 in Apple). Brave the multitude of heart-stopping dangers as you make your

tortuous way through the deadly rooms. Test your cunning against overwhelming odds!

Chilling suspense and unknown terrors await you behind every door. You must evade man-eating robots, monstrous stompers, sweeper drones and tons of falling boxes — and make death-defying leaps from moving platforms.

Only your artful handling of this dangerous assignment can save the world from destruction!

For Apple II & IIe, IBM PC & jr, Atari, Commodore 64, ColecoVision & Adam.

©1984 by MicroLab, Inc. The Heist is a registered trademark of MicroLab, Inc. Apple II & IIe, IBM PC & jr, Atari Commodore 64, ColecoVision & Adam are registered trademarks of Apple Computer, Inc., IBM Corp., Atari, Inc., Commodore Electronics, Ltd. and Coleco Industries, Inc., respectively.

micro fun

THE COMPUTER ENTERTAINMENT DIVISION OF MICROLAB, INC.
2699 Skokie Valley Road, Highland Park, IL 60035 • (312) 433-7550

CIRCLE 145 ON READER SERVICE CARD

Input/Output

Adam: Yea

Dear Editor:

As the owner of a ColecoVision Adam Expansion Module, I wanted to thank you for your extensive, objective review of the Coleco Adam. What a refreshing relief from the poorly researched, headline-mongering drivel I've read elsewhere!

I also wanted to extend a suggestion to Mr. John Butler of Virginia Beach, the man whose Adam seemed to be "blowing up" letters: try another Digital Data Pack tape—or another track on the same tape.

I encountered what I think is the same problem: strange hieroglyphic characters when I tried to go back over the second page of text. Yet this happened on only one track of the Data Pack. I therefore assumed the problem was in the tape itself and kept a "dummy file" open on the track where the malfunction occurred. The problem has never recurred on any other track.

Also, I'd like to agree: Coleco service is extremely fast and courteous. When I discovered three or four minor glitches in the word processing program, Coleco's service agent, Honeywell, installed a revised CPU overnight under warranty, and the Adam has been working perfectly ever since.

Finally, the reviewer, Stephen Gray, made one error of some significance in an otherwise flawless critique: he says one should "turn Adam off, put the SmartBasic tape into the drive, turn Adam back on." Wrong! One should insert or remove a Data Pack only when Adam is on and the tape has stopped moving. Turning Adam on while the tape is already in the transport may erase the files.

Jerry P. Danzig
105 E. 24th St.
New York, N.Y. 10010

Adam: Nay

Dear Editor:

Regarding "Coleco's Adam" (April, 1984), are you kidding? You clearly state that this computer is "good for beginners." Do you really think a computer with a 50% return rate is a good place to start?

The tape drive is extremely unreliable. The printer rarely works. The software is full of bugs and devoid of documentation, and local service is non-existent. Many of my friends have given up on home computers with far less reason than this.

If your readers have \$750 to spend on a home computer, word processor, and game machine, may I make the following

suggestion? Buy this:

Atari 800XL 64K Home Computer	\$299
Atari 1027 Letter Quality Printer	\$299
Atari 1010 2-channel Cassette Recorder	\$74
Atariwriter Word Processor Cartridge	\$79
	<u>\$751</u>

Perhaps you know something you are not telling us, but I can see no advantage to buying a Coleco Adam over an Atari or Commodore computer.

George F. Rice
122 Autumn Dr.
Vicksburg, MS 39180

Adam: Hey

Dear Editor:

I am writing to inform you of an error that appeared in the article entitled "Coleco's Adam" (April 1984). The author states that, like Apple Basic, Smart Basic looks at each line for errors as it is entered. Apple Basic does not check each line for errors as it is entered. There is also a problem that I hope you might be able to help me solve. I am having problems sending, from a Basic program, the control codes that set the tab stops on the Apple Imagewriter printer. If you or any of your readers could help me in this, I would be much obliged.

John Engstrom
4008 Fawnhollow
Dallas, TX 75234

Cleaner Clarification

Dear Editor:

The article in your December issue on disk head cleaning kits was worthwhile reading, but I would like to point out three things:

1. The Nortronics kit does not get 32 cleanings per disk; it gets only four (one for each logical track). This raises the calculated cost per cleaning from \$.13 to \$1.02, or just about average.

2. The big feature of the Nortronics kit, the use of a different area of the cleaning disk each cycle, is obviated (at least on the TRS Models I and III) by a slight bug in the supplied program which outputs the logical track (1-4) to the drive instead of the physical one (4, 13, 22, or 31). Physical tracks 1-4 are so close together as to be essentially the same spot. The simple fix is:

3000 POKE 14319,B for the Model I

and

3000 OUT 241,B for the Model III

3. Users of any kit who have single-sided drives get a bargain: they can flip the cleaning disk over and use the other side. I suggest marking the hub area of the used side in some way to avoid confusion.

Bob Blumenfeld
8824 West 34th St.
St. Louis Park, MN 55426

Notices

Game Camp

A one-week course on programming your computer to play chess, blackjack, checkers, bridge, and othello will be given by computer game experts Monty Newborn and David Levy at the Salzburg Inn in Stowe, Vermont. The course will be held twice: August 13-17, 1984 and August 20-24, 1984. The cost is \$550 a week.

The course is intended for people who can program in Basic, Fortran, or Pascal. Attendees are encouraged to bring their own computers, but it is not necessary for enrollment. As a renowned resort area, Stowe features a variety of summer sports, entertainment, and excellent restaurants. For information call (514) 481-1766.

Bibliography

More than 300 new books are listed in the 17th edition of the *Annual Bibliography of Computer-Oriented Books*,

recently released by the University of Colorado.

All introductory-type books published prior to 1980 were deleted. Despite the deletions, the bibliography still contains more than 1200 books from 173 publishers. The bibliography separates the books into 86 categories and catalogs them according to type (reference, textbook, handbook) and style of presentation (programmed instruction, case study or narrative).

Copies of the bibliography are available for \$4 from Computing Newsletter, Box 7345, Colorado Springs, CO 80933. The cost is \$6 if an invoice is required.



WHAT A PAIR !

Tecmar's Graphics Master™ & Lotus 1-2-3¹

Graphics Master is the only board that creates *both monochrome and color* graphics for Lotus 1-2-3.

You can also run IBM compatible software because Graphics Master emulates both the IBM Color Graphics Adapter and the Monochrome Adapter.

We are pleased to announce that Graf-Talk² and MetaWindow³ software take full advantage of Graphics Master's high resolution graphics.

Graphics Master is the only board that will do all of the following with appropriate software:

- High resolution color graphics - 640 x 400, 16 colors
- High resolution monochrome graphics - 720 x 700
- Run software for IBM Monochrome Adapter
- Run software for IBM Color Graphics Adapter



TECMAR
the power behind the PC

Tecmar Inc. 6225 Cochran Road Solon (Cleveland), Ohio 44139-3377 Phone: (216) 349-0600 Telex: 466692

¹ Registered Trademark of the Lotus Development Corp. ² Registered Trademark of the Redding Group Inc. ³ Registered Trademark of the Metagraphics Corp.

CIRCLE 179 ON READER SERVICE CARD

Creative Computing Benchmark

The Creative Computing benchmark is a short test of computational speed and accuracy and the random number generator in Basic.

Computers are listed in order of completion time of the test in minutes and

seconds. In the accuracy measure, the smaller the number, the better (.00000001 is good while .187805 is poor).

We have taken note of the criticisms of this simple test and have devised a new test which is considerably more valid and

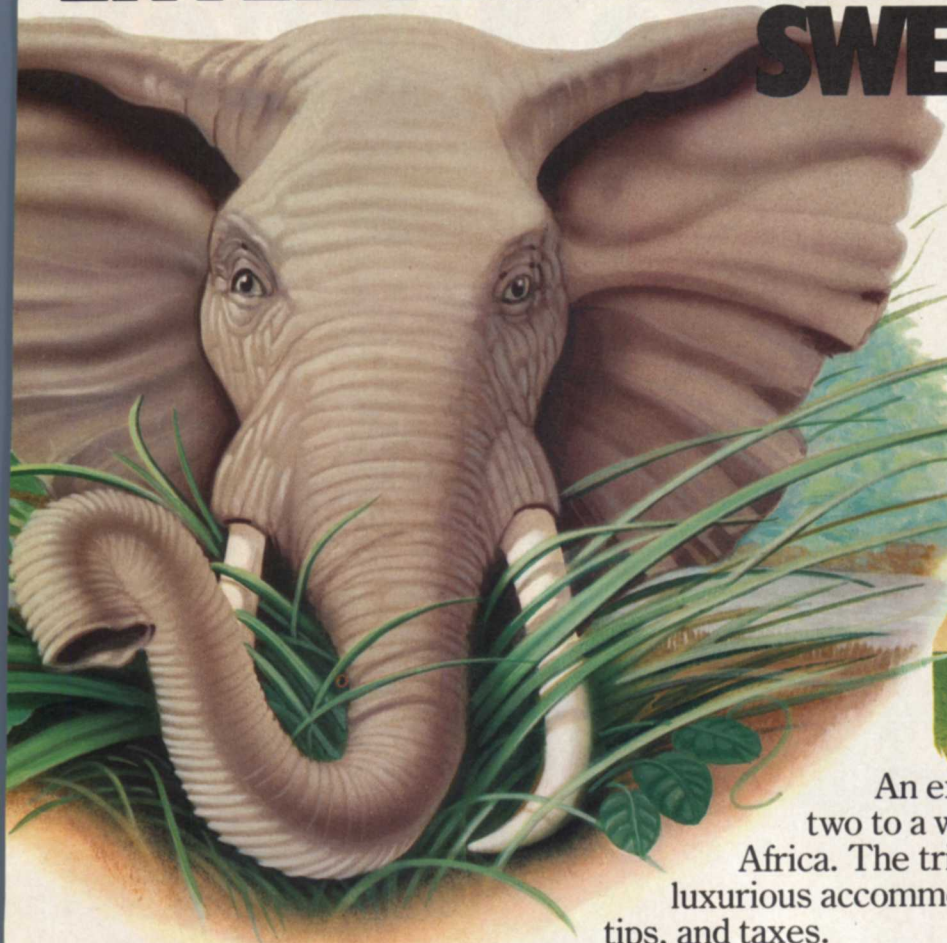
comprehensive. Watch for it in the early fall.—DHA

```

10 ' Ahl's Simple Benchmark
20 FOR N=1 TO 100: A=N
30 FOR I=1 TO 10
40 A=SQR(A): R=R+RND(1)
50 NEXT I
60 FOR I=1 TO 10
70 A=A^2: R=R+RND(1)
80 NEXT I
90 S=S+A: NEXT N
100 PRINT ABS(1010-S/5)
110 PRINT ABS(1000-R)
    
```

Computer	Time	Accuracy	Random	Computer	Time	Accuracy	Random
Cray 1	0:00.01	.0000000014	6.1	Heath H-8, Trionyx 280	1:02	.187805	3.1
Amdahl 470	0:00.04	.00000000011846	12.4	IBM 34 (long precision)	1:02	.000000001307	16.2
Harris H-1000	0:00.06	.000003810971975	0.9	Vector Graphic 3 VIP	1:04	.0338745	7.5
IBM 370/67	0:00.08	.000000000345835	4.6	Zenith Z-100 (8085)	1:04	.187805	9.5
Control Data Cyber 855	0:00.09	.00000000354703	6.1	Micromation Mariner	1:05	.187805	7.4
Control Data 6400	0:00.14	.00000000354703	6.1	HP 125	1:08	.187805	7.4
Harris H-800	0:00.14	.000004418194294	0.9	Toshiba T100	1:09	.187805	7.4
DEC System 10	0:00.18	.00494385	0.9	Epson QX-10, MBasic	1:09	.187805	7.4
DEC VAX 11/780	0:00.28	.00113525	5.3	Osborne 01	1:10	.187805	7.4
DEC 11/70 RSTS/E w/VFP	0:00.31	.000000000160298	9.8	TRS-80 Model II	1:11	.187805	3.1
DEC 11/23 (MuBasic)	0:00.34	.000000000158025	0.8	ModComp Zorba 200	1:11	.187805	7.5
Burroughs B6810	0:00.62	.0000000056304	21.6	ADD Multivision 8085	1:15	.187805	7.5
BTI 8080, Rev. 4.2	0:01.41	.00000000023	9.9	Sharp MZ-3541 w/FDOS	1:16	.00001403	4.1
DEC VAX 11/780 (double)	0:01.5	.000000000163203	5.3	Mattel Aquarius	1:17	.187805	10.0
DEC PDP 11/44	0:01.8	.000000000160298	2.4	Heath H-89A (Basic-80)	1:17	.0670776	7.5
DEC PDP 11/70 (RSTS)	0:02	.000000000160298	15.8	Epson QX-10	1:18	.187805	7.4
IBM PC (Basic87)	0:02	.000000000006082	07.3	Lanier/AES Typomaster	1:18	.187805	7.4
Prime 550	0:02	.0000000072876	12.2	HP-85A	1:20	.000000002	14.3
HP 9045B (390 bit alic)	0:03	.00000002	23.1	OSI Challenger 1P	1:20	.32959	5.5
Control Data Cyber 730	0:03	.00000000354703	6.1	Morrow MD3 (Basic 10)	1:21	.000473	5.6
HP 3000/44, single pre.	0:04	.112549	6.0	Lanier/AES 7100	1:24	.187805	7.4
HP 3000/44, double pre.	0:05	.0000000000271996	9.4	HP-86A, B	1:25	.00000002	13.6
HP 9836	0:05	.000000000127329	5.5	Tektronix 4051	1:26	.000000014042598	8.1
BTI 5000	0:05	.097412109151	10.3	Digital Group Bytemaster	1:27	.000002779	3.6
Control Data 3500	0:05	.001302457	2.8	NEC PC-8001A	1:29	.0338745	3.0
Wang 2200 SVP	0:05	.0000000076	3.9	Onyx C6001/MU	1:30	.0000000779	3.6
Alpha Micro AM 1000E	0:05	.0000000036911	12.4	Sanyo MEC 550, 555	1:30	.0626221	1.1
IBM PC (Compiled Basic)	0:06	.01159668	20.4	Atari 800, 1200 (MBasic)	1:35	.150879	2.1
DEC PDP 11/44 (RSTS)	0:07	.000000000158025	11.5	OSI C8P-DP	1:35	.0010414235	18.6
IBM S/38, model 7	0:07	.000000000000185	4.6	Heath H-8	1:35	.00561523	2.7
Wang PC	0:07	.005859375	7.2	Apple Macintosh (dbl)	1:36	.0000000458	4.2
Tandy Model 2000	0:07	.005859375	7.2	Kaypro II	1:36	.187805	7.5
Data General Eclipse	0:08	.000000000345835	1.1	Sony SMC-70	1:37	.0000000458	3.0
Eagle 1600	0:08	.005859375	7.2	HP-75C	1:38	.00000002	7.4
Stearns Micro	0:08	.005859375	7.1	North Star Horizon(10 dig)	1:41	.000473	3.6
Burroughs B20	0:09	.005938744544977	3.2	NEC PC-8201	1:44	.187805	9.3
Symbolics 3600	0:09	.111328125	8.5	Ekdys Sorcerer	1:47	.0338745	13.2
DEC PDP 11/24	0:09	.0000000000160298	9.9	MicroOffice RoadRunner	1:48	.187805	7.4
Alpha Micro AM 100T	0:10	.000000000371337	12.4	Telemar 3000	1:48	.187805	7.4
DEC Professional 350	0:11	.00000000000602967	15.8	Apple II	1:48	.011914	23.7
HP 9825	0:11	.000000882	9.1	Vic 20	1:49	.0010414235	23.7
NorthStar 8/16	0:11	.005859	7.2	Commodore SuperPET	1:50	.000209331512	20.4
Burroughs B22	0:12	.005859375	15.7	HP 9830B	1:52	.000000009	13.1
NEC Adv Pers Comp	0:12	.005859375	7.2	Commodore 64	1:53	.0010414235	8.9
Tektronix 4054	0:12	.000000014042598	8.5	Apple IIe, II+	1:53	.0010414235	12.0
Olivetti M20	0:13	.0114136	6.2	Franklin Ace 1000, 1200	1:53	.0010414235	12.0
Apple w/Saybrook 68000	0:13	.000000000011	10.4	NEC PC-8001A	1:54	.187805	7.4
Leading Edge PC	0:13	.005859375	7.1	Rockwell Aim 65	1:56	.0010414235	14.7
TI Professional	0:15	.005859375	7.1	Compucolor II	1:57	.0338745	1.4
Compaq	0:15	.005859375	7.1	TRS-80 Model III	1:59	.0338745	5.8
HP 150	0:15	.005859375	7.1	Micro Color Computer	1:59	.000596204867	7.6
HP 9845B	0:15	.000000882	23.1	Commodore CBM 8032, 2001	2:01	.0010414235	1.4
Zenith Z-100 (8088)	0:17	.005859375	9.7	HP 710	2:03	.000000002	5.8
Samurai 516	0:17	.01159668	6.3	Heath/Zenith H-89A	2:04	.187805	7.4
ACT Apricot	0:18	.005859375	7.2	Atari 2600 Graduate	2:15	.000224679708	7.9
Canon AS-100	0:18	.005859375	7.2	TRS-80 Model I	2:19	.0338745	12.0
Corona FMD	0:18	.005859375	7.2	Color Computer	2:23	.000596204867	7.3
Sharp PC-5000	0:18	.005859375	7.2	Atari 800 (fastchip)	2:23	.0006075	7.0
IBM 34 (short precision)	0:18	.1967	25.2	Dragon 32	2:29	.000596204867	7.3
Eagle PC-2	0:19	.005859375	7.2	Epson HX-20	2:36	.0338745	23.8
Apple w/unsped	0:19	.041015624	8.0	DAI	2:38	.012666	2.6
Victor 9000	0:20	.005859375	7.2	Timex/Sinclair 1000 (fast)	2:43	.00041294098	8.7
DEC Rainbow 100	0:20	.005859375	7.2	Interact Model R	2:50	.0338745	8.1
Acorn BBC Computer	0:21	.0000128746033	5.2	Wang 2210	2:52	.000011432	12.5
Columbia MPC	0:21	.005859375	7.2	OSI Challenger 1	3:07	.0010414235	13.9
Computer Devices DOT	0:22	.005859375	7.1	Lanier/AES Superplus	3:30	.187805	7.4
Compucorp 775	0:22	.005859375	7.1	SpectraVideo 310/320	3:40	.00000002058	8.7
Apple II w/ALP 8088	0:24	.00007558	10.4	TI 99/4A	3:46	.00000011	2.6
IBM PC	0:24	.01159668	6.3	Radio Shack PC-3	4:00	.00000627	10.9
LMI CADR	0:24	.000202178789551	8.6	TI 99/4A, Extended	4:10	.00000011	10.7
Monroe EC8000 (single)	0:27	.247559	10.8	Oric-1	4:10	.0010414235	12.1
Gimix 6809, TSC Ext Bas	0:29	.0000000007841407	0.9	Datapoint 1800	4:16	.0000012042	11.3
GCE Vectrex	0:33	.0753174	0.2	Sinclair ZX81	4:23	.0006685257	6.3
Apple II, Titan Accel	0:33	.0010414235	4.5	Sinclair Spectrum	4:39	.0006685257	3.5
Sharp MZ-80	0:37	.00022172928	8.6	TRS-80 Model 100	4:54	.0000002058	0.7
TI DS990/12 (Mini TS)	0:36	.00000000388	3.1	Timex 2068	4:55	.0006076411	12.0
Lanier/AES 7200, C20	0:38	.04	4.0	Casio FP-200	5:05	.00723	30.3
Laser 2001	0:40	.0003272295	17.4	Sharp PC-1500 (RS PC-2)	5:10	.0000288	7.8
CompuPro (8085)	0:41	.187805	7.4	Cromemco C-10	5:18	.00000001	16.1
Monroe EC8000 (double)	0:42	.0000000000060282	10.8	TI CC-40	5:41	.000000011	6.2
Epson QX-10	0:42	.0670776	7.5	Sanyo PRC-25	5:41	.000245755646	0.7
Memotech MX-512	0:46	.000252962112	6.9	Franklin 1200 (CBasic)	5:47	.0000000744	14.3
Coleco Adam	0:47	.000426292419	6.2	Canon X-87	6:03	.0000002058	24.9
HP 9820C	0:48	.000000000127329	23.2	Atari 1200XL	6:45	.013959	5.2
Grid Compass	0:48	.000000000000068	2.3	Atari 400/800	6:48	.012959	22.6
Lobo Max-80	0:48	.0338745	5.8	Casio FX-702P	8:35	.00000034	2.8
Lynx	0:51	.155	14.1	Casio FX-702P	9:32	.000000627	3.5
TRS-80 Model 4	0:53	.0670776	6.5	Sharp EL-5500	9:55	.00000288	7.2
Panasonic JR200	0:57	.00021401514	15.1	Sharp PC-1250	11:14	.0000288	5.9
SCS 100	0:59	.187805	7.4	Magic	11:45	.0000000744	---
IMS 8000	0:59	.187805	9.6	Midwest Sci 6800	13:48	.1597	11.5
Alpsa ACI-1	0:59	.187805	7.4	Timex/Sinclair 1000(slow)	16:55	.00041294098	7.4
OSCMate II	0:59	.187805	7.4	IBM System 23	18:48	.00000005503	3.4
Xerox 820-II	0:59	.187805	7.4	HP-97	23:00	.0000288	---
Midwest Sci 6800 (SDOS)	0:59	.014842	0.6	Sharp PC-1211	20:32	.0000288	7.2
Morrow Micro Decision	1:00	.187805	7.4	HP 11-C	30:34	.000034	0.8
CCS 2210	1:00	.187805	7.4	Central Data 2650	82:31	.033526	4.6
Access Matrix (Actrix)	1:00	.187805	7.4	TI SR-50 (Calculator)	12.7 days	.193704289	16.4

ENTER THE ELEPHANT SAFARI™ SWEEPSTAKES.



GRAND PRIZE (1 winner)



An exciting two week adventure for two to a wild game preserve in Kenya, Africa. The trip includes airfare, luxurious accommodations, meals, tips, and taxes.



SECOND PRIZE (25 winners)

A Bell & Howell 35mm camera. The 35J complete with fine Lumina lens completely eliminates complicated focusing.



THIRD PRIZE (100 winners)

Camouflage Nylon Duffle Bag. This handsome bag is water repellent and double reinforced at all stress points.

And thousands of Elephant Safari camouflage T-shirts featuring the Elephant logo.

FIRST PRIZE (5 winners)

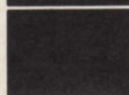
A Deluxe Camping Package featuring an 8' x 10' Wenzel Cabin Tent, four Wenzel sleeping bags, plus a Coleman lantern, stove and cooler.



HOW TO ENTER

No purchase necessary. Just come into a participating Elephant Safari Sweepstakes dealership where you'll find free entry blanks and official rules. While you're there, check out our full line of quality Elephant memory disks and accompanying products. Entries must be received by July 31, 1984. Void where prohibited.

Dennison



For the Elephant dealer nearest you, call 1-800-343-8413. In Massachusetts, call collect 617-769-8150.



ELEPHANT NEVER FORGETS

CIRCLE 123 ON READER SERVICE CARD

"Excuse Me,



Make Way For Hayes' Please.

An advanced, easy-to-use data management system for the IBM® PC and compatibles.

Want to get your paperwork out of a clumsy file cabinet and onto your PC's screen, where you can manage it better? Frustrated with data base software that's either too limited or too difficult to use? Hayes offers you a simple word of kindness.

Please™. A powerful, yet easy-to-use, system for organizing and managing your information. *Please* is flexible enough to store any data you enter, and it'll return data to you in exactly the form you need. *Please* does more.

It does it all faster. And it's sure to please!

"The menu, Please?"

Menus list all your options and tell you exactly which keys to press for every *Please* feature.

That's to be expected. As the telecomputing leader, Hayes built its reputation on quality design, reliability

and customer support.

Now these same standards have been applied to a new data management system that is going to instantly change the way you do business!

Say you're looking for an efficient way to maintain sales data. *Please* leads you every step of the way in creating a sales database that might include names, addresses, dates and figures. These categories are called "fields" in database lingo, and they're the very heart of your database structure.

Want last month's total in a particular region? Press a few keys and it's yours! A few more keystrokes and you'll know who's moving product, and what's your biggest seller.

Please will supply you with labels for a mailing to selected customers. It can send customer information to your word processor for a promotional letter. And it can receive data from

your spreadsheet program. *Please* will even look up a name and company for you, your Hayes Smartmodem* will dial the phone number, and you're ready to talk!

Taking this same sales database, you might also want to define special

fields for a custom Output Plan.

With a defined field for "COMMISSIONS DUE,"

Please can automa-

tically compute each salesman's commissions, and print them out in a report of your own design. All this and more, just for saying "Please."

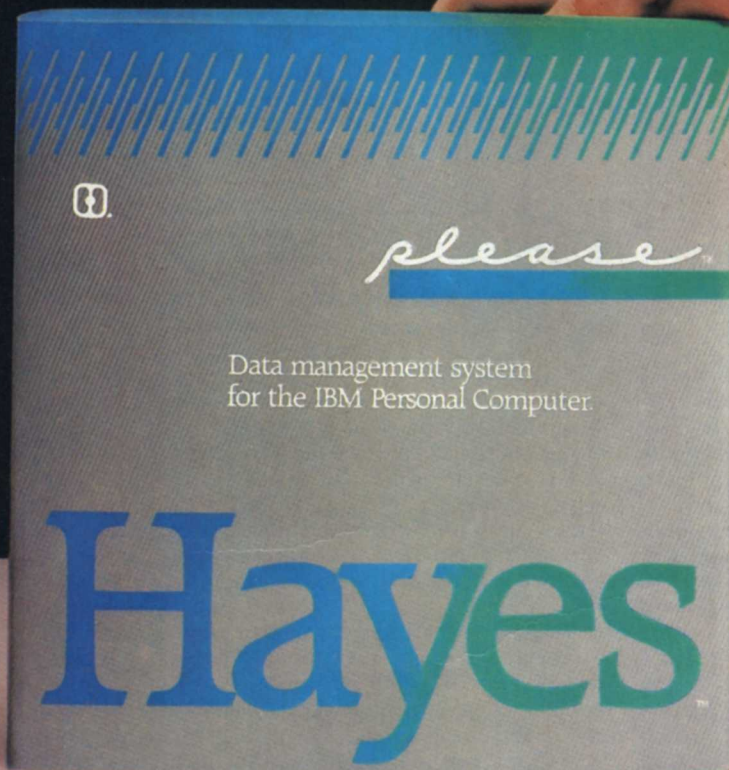
And if you ever change your mind and want to change the structure of your database, please feel free. Step-by-step instructions show you how.

You have the same flexibility with any database you and *Please* design. You can store up to 16 million records and 200 custom Output Plans for each database! More than you're likely ever to require. But isn't it nice

"Make it snappy, Please!"

Need a report fast? You and *Please* can put together a Quick List in a matter of seconds.

Please."



"Put it here, Please."

Design a special screen format to position data in a particular place.

Just in case you ever need it?

Now you might think that a data management system that does all this must be difficult to use. Right? Rest assured. *Please* works hard so you don't have to. An easy-to-follow sample disk shows you everything you need to know to create your first database. Three *Please* menus show you which keys to press to access every feature. And whenever you need it, *Please* provides on-screen HELP messages, tailored to a specific task. So you needn't waste time reading through a list of unrelated instructions on your screen. Or stop what you're doing to consult a manual. In no time at all, and with no assistance at all, you'll be a *Please* database pro!

knowing all that storage power is there?

"Merge these, Please!"

Combine data from one database into another, without changing your original.

Everything about *Please* is designed to save you time and effort. So what could make data management even easier? *Please Application Templates*, that's what!

To help you get up-and-running immediately, we've developed a series of practical, pre-designed templates. You'll appreciate their well-thought-out structure, and "fill-in-the-blank" ease. Choose several! For business and personal use.

Including *Mailing List*, for storing names and addresses and producing mailing lists. *Contacts*, for man-

aging facts and figures about your sales contacts. *Applicants*, for following applicants throughout the interviewing process. *Appointments*, for maintaining your calendar and tracking all of your business expenses. *Household Records*, a complete home management system. And more! Your dealer has details!

Buy *Please* now! Get a FREE Mailing List template from your dealer.

Second FREE template of your choice, direct from Hayes!

Help yourself. Please! And take advantage of these two valuable offers. See your dealer right away!



Hayes

Hayes Microcomputer Products, Inc.,
5923 Peachtree Industrial Blvd.,
Norcross, Georgia 30092. 404/441-1617.

CIRCLE 129 ON READER SERVICE CARD

Apple Macintosh

Cutting Through The Ballyhoo

The first step to knowledge is to know that we are ignorant. —Socrates

Why, a four-year-old child could understand this. Someone get me a four-year-old child. —Groucho Marx

The shorn, brainwashed drones sit motionless in row after benumbed row. In tight close-up on the oppressive view-screen, an awful, sneering face spouts empty Newspeak slogans while computerized rhetoric scrolls by left and right.

The hall is blue and motionless. Suddenly, an athletic blonde woman appears, running down an aisle towards the apparition of Big Brother. In her hands there is grasped a heavy sledge of the type that is used in Olympic competition. She stops and sets. Obviously practiced in the hammer throw, she swings the tool away. We watch it fly in slow motion—we watch it shatter the viewscreen to bits in a flash of light. We see for the first time a glimmer of feeling cross the faces of the multitudes. Their mouths simultaneously gape into slackjawed amazement.

Fade to white. And the words "On January 24th, Apple Computer will introduce Macintosh. And you'll see why 1984 won't be like 1984."

Orwell that Ends Well

Hype, certainly. And just the tip of a multimillion dollar ad campaign iceberg that included lavish 12-page four-color inserts in *Time* and other major noncomputer magazines. The launch of Apple



HARDWARE EVALUATION

John J. Anderson

Macintosh was quite a media event.

And yet something about the commercial seems more than mere hype—seems to have hit home somehow. Directed by Ridley Scott (director of the modern cult classic *Blade Runner*), the 60-second spot touched a nerve across the nation, even though you could count the total airings of the spot on the fingers of one hand. Something about it—its mood, its tone, its timeliness, its youth, its feeling of liberation, its likeness to music video—captured the public imagination.

And perhaps the commercial touched a nerve with more than a few computer users—those who feel frustrated, shackled by current software restrictions. Perhaps it excited a few potential buyers—those who have wanted a micro but felt oppressed by the complexity of existing systems. Personally, I identified closely with the drones, and not just because they were mouth-breathers. If I found that something *truly better* was available I would hurl that hammer myself.

Mac Under the Microscope

But you must be careful about buying promises, and that is exactly what the 1984 commercial attempted to sell. In its current form, the Macintosh is the distilled embodiment of a promise: that software can be intuitively easy to use, while remaining just as powerful as anything else around.

That's a tall promise.

By this time you have undoubtedly already read and/or heard about the Macintosh machine. And what you have heard is very likely to have been praise, though you may not be so clear on if or why such praise is merited. The honeymoon phase is still in progress, you see, and most reviewers, it seems, are so moved, so awe-stricken, so swept away by the excellent features of the Mac, they are willing to gloss over the not-so-excellent.

And there are more than a few of those.

Don't be misled, however. You will not be reading a pan of the Apple Macintosh in the pages of *Creative Computing*. We are quite impressed with the machine,



emphatically enthusiastic about its philosophical underpinnings, very hopeful for its future. We just feel it is about time the hard questions were asked, and answered alongside the starry-eyed hoopla. It is time for a good hard look at Macintosh under a piercing and objective light.

Objective Light on the Subject

Whether or not the Macintosh is actually a breakthrough, it surely *looks* like one. It doesn't look like much of anything that has come before (with the possible exception of the moribund Vectrex videogame unit, which, if painted beige, would bear a startling resemblance).

The Macintosh is small. With a recessed handle in the top of the main unit and a total weight, complete with internal CRT, of 22 lbs., the Mac qualifies as a bona fide *transportable*, meaning you can move it around relatively easily when the time comes. Drop it into its custom-made rucksack (a \$100 option), and take off.

Sit it on your desk, and you will quickly notice how little room it takes up. Its footprint is barely larger than a sheaf of papers. And though the unit is rather bizarre-looking at first glance, it is also rather handsome. Its looks grow on you.

The Keyboard

Attached by a modular phone cable to the main unit is the detached Macintosh keyboard. This is a 58-key, full-stroke Selectric-style layout (see Figure 1), with a somewhat stiff but very professional feel.

Based on my experience with the Mac, I think it is unlikely that you will ever be pulling the keyboard onto your lap. Still, the detached design is desirable. It makes comfortable positioning of the keyboard entirely independent of comfortable positioning of the screen, and that is extremely important. At the same time, the keyboard can be pushed away in an instant,

so that you may reclaim precious desk space when access to the keyboard is not immediately necessary.

Noticeably lacking on the Macintosh keyboard are special function keys and directional cursor movement keys. These are replaced by the mouse pointer peripheral from which the Mac receives all directional inputs. I am told that cursor movement keys appear on the add-on numeric keypad (a \$130 option), but these are not read interchangeably with mouse movement. We shall be examining this question more closely up ahead. As for special function keys, the idea is that the

cursor mimics your moves. At first, controlling the screen cursor with the mouse is anything but intuitive. The mouse seems cumbersome, and hard to control for detailed work. (Unlike the Summa Graphics mouse, by the way, tracing is out of the question.) With a few days of practice, however, working the cursor with the mouse becomes second nature. (Once you learn to lift the mouse when you run out of desk space and reposition it so that you have the room you need, you have learned the major secret of effective mousing.)

The mouse has a mechanical device



Figure 1. Detachable keyboard allows comfortable positioning.

mouse renders them unnecessary. I'm all for that.

The Mouse

Then there is the mouse itself. Though it is a tiny thing, better clear at least a square foot or so of desk space for moving it around. The more room you make for it, the easier control of the mouse becomes.

As you move the mouse, an on-screen

with a rolling ball inside it, as opposed to optical or pull tracking, to measure relative movement. Therefore your desk area must be free of dust and particulate matter (such as Ritz cracker crumbs) for the mouse to work reliably. The documentation actually tells you how to remove the ball for an occasional cleaning.

The Mac mouse has a single button on its top. Hence there are no inhibitions

SYSTEM PROFILE

CPU: 68000 32-bit Motorola microprocessor

Memory: 128K RAM, 64K ROM

Display: 9" diagonal b/w bit mapped monitor 512 x 342 pixel graphics resolution

Keyboard: Detachable 58-key fullstroke keyboard

Disk Drives: One single-sided 3 1/2" microfloppy drive (400K storage)

Sound: Four-channel sound/music capability

I/O Ports: RS-232/RS-422 connector

Other: Mouse controller, clock/calendar (battery backup), modem/AppleBus connector, second disk drive connector (may also be used with a hard disk when available)

System Software: System software supplied in ROM includes Group Code Recording disk operating system and QuickDraw graphics package.

Desktop Accessories: Calculator, Clock, Puzzle, Control panel, Scrapbook, Notepad, and Key caps. Additional desktop software includes Wastebasket, Get Info, Disk Copy, and Clipboard.

Instructional: Guided Tour learning system disk with audio cassette. MacWrite and MacPaint included free for a limited time.

Dimensions: 13" x 10 1/2" x 9 3/4" 22 pounds

Summary: Without a doubt, a hardware and software breakthrough.

Price: \$2495 for Macintosh \$2990 for Macintosh and Imagewriter Printer

Manufacturer:
Apple Computer, Inc.
20525 Mariani Ave.
Cupertino, CA 95014
(408) 996-1010

concerning which button to press when the time comes to press a button. It is



Macintosh mouse: point and click.

impossible to make the wrong choice. When designing a mouse for ease of use, a single button helps considerably.

Double-clicking the single mouse button frequently also acts as a short-cut mechanism, to obtain certain other functions.

The System Unit

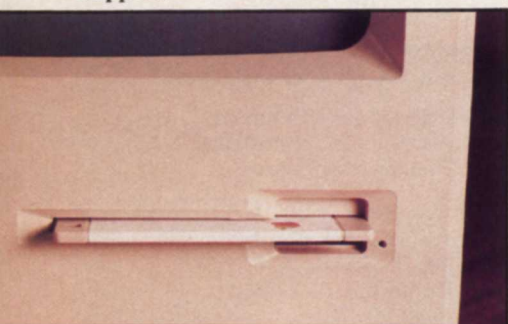
The major business goes on inside the main unit of the Macintosh, so let's get a closer look at it.

Your first concern about the system component is bound to concern the CRT display. Is a 9" diagonal screen truly big enough to allow extended viewing without fatigue or strain?

The answer in this case is yes, and the reason is the super-high screen resolution of 512 x 342 monochrome pixels. Add to this the fact that nearly all text reads out in black type on a white background, emulating an actual printed page, and you have an exceptionally legible display. Not once have I found myself lamenting the diminutive screen size. Indeed, after a few minutes on the Mac, you will dismiss that question for good.

The Microdrive

Also appearing on the front of the main unit is the doorless disk drive slot. A single-sided 3 1/2" Sony microfloppy drive is standard and internal to the system unit of the Mac. Each disk can hold approximately 400K of data on a single side. In addition, the disks themselves can take much greater abuse than conventional floppies.



Internal disk drive slot.

Each disk has a spring-actuated sliding aluminum cover on it, which the Macintosh opens automatically when the disk is inserted, and shuts automatically upon ejection. Thus the head slot is protected at all times. The disk case is rigid, and as you may have heard before, "slips into a shirt pocket."

Apple uses a proprietary technology to get 400K onto a side: nearly 100K more than the conventional Sony format. More importantly, this effectively eliminates the possibility of third-party Macintosh "work-alikes." This is a good indication of the savvy that went into the design of the Macintosh.

At times, when a disk is spinning in the drive, it sounds jarringly like a cheap friction toy. This is because the Macintosh drive utilizes a variable RPM speed. The result is the ability to write more data to the outer disk tracks. Drive rotation speed varies from 390 to 600 RPM, depending on the track.

No read/write light is necessary on the Mac drive; when a disk is in the drive you

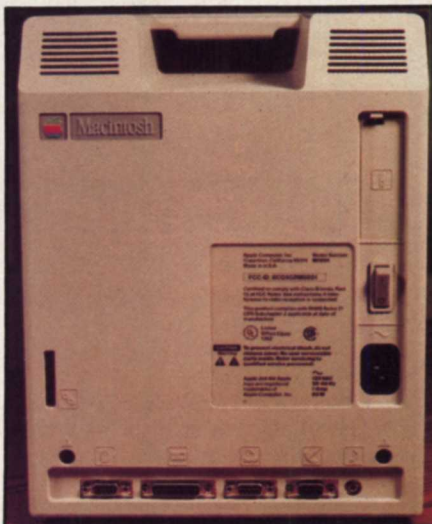


Figure 2. Rear of system unit.

cannot remove it without undertaking rather drastic measures. Nor is there a disk eject latch or button. Disk ejection is controlled entirely through software, as we shall discover ahead.

If, as a result of some emergency, you *must* manually eject a disk from the drive, you can effect this by pressing the point of an unbent paper clip into a small hole beneath the drive slot.

The only other features of the system unit front side are the brightness knob and the keyboard input jack. The brightness knob is the only CRT control externally available on the Mac, and the only one necessary. The keyboard input consists of a modular telephone jack.

Now let's flip the Mac system unit around for a look at its rear panel.

Here we see the power switch and six

connector jacks (Figure 2). These connect to AC power, the mouse, printer, optional second disk drive, optional modem or AppleBus network line, and optional external sound amplifier. You will also notice the Macintosh nameplate back here on the rear of the computer. Why? My guess is to keep the front of the machine as nondistractive as possible. The Apple Logo appears up front and constitutes identification enough.

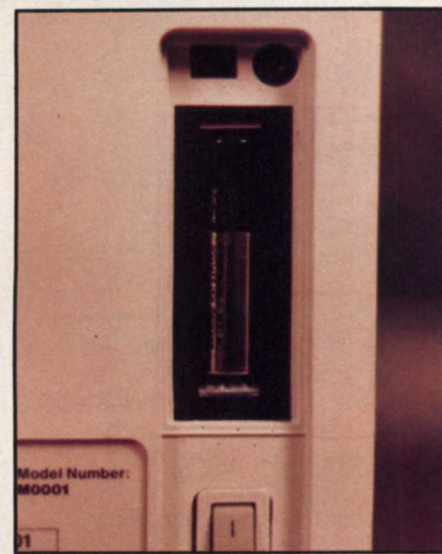
Some things you *won't* find on the rear panel of the Mac are an expansion bus, parallel port, or video output jack. We shall return to the issue of these omissions. Standard DB-25 RS-232 serial connection is available, however, using the printer port.

The top right side of the back panel sports a battery compartment. The special 4.5 volt alkaline battery maintains the built-in clock/calendar, as well as serving to keep user-selectable settings in memory between power-ups. The documentation estimates a battery life of approximately two years.

Inside the main unit is an unimposing 9" x 9" circuit board with a 32-bit 68000 central processor chip residing upon it. The CPU runs at 7.83 MHz, which is fast indeed (see (Figure 3) for the benchmark test results). The Mac sports 128K of RAM and 64K of ROM. Six special chips are most responsible for compactness of the motherboard. Each in itself is the equivalent of an actual circuit board.

A major benefit of Apple's advanced motherboard design is not only compactness, but the fact that the system does not require a cooling fan. If there is one thing that drives me to distraction on certain micros which shall remain nameless, it is the constant hum of their cooling fans. Computers can, and should, run in total silence.

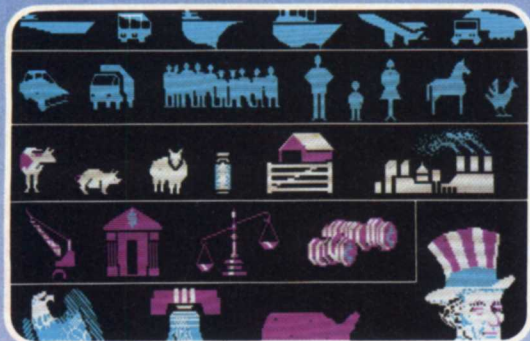
Except when we *want* them to make



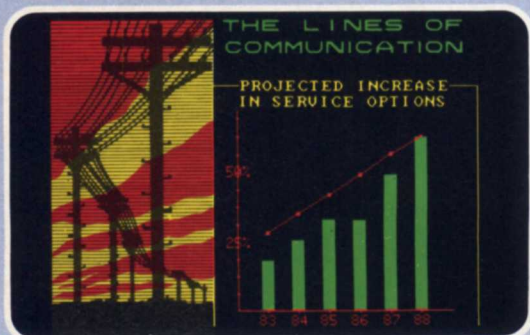
Internal battery powers clock/calendar.

VCN EXECUVISION

The Presentation Graphics Program
from Prentice-Hall, Inc.



ABOVE: just two of the library slides from which you can pick images to enhance your presentation data.



"You don't have to be an artist to create presentation slides like these in minutes!"

"...Prentice-Hall's VCN ExecuVision will become the standard against which other programs will be gauged."

—PC Magazine

CIRCLE 157 ON READER SERVICE CARD

VCN ExecuVision is an incredibly advanced software program that allows professionals in every field to create top quality visual presentations directly on an IBM PC or IBM XT. In minutes, you'll prepare exciting presentations that previously would have taken days, or weeks to complete. Presentations that you can run directly on your computer monitor; with an overhead projection screen; or, convert to hard copy or slides.

Automatically plotted charts and graphs are just the beginning. You'll have access to hundreds of pre-drawn images and clip art from special add-on software graphics libraries such as:

- The Border Collection
- The Initials & Decorative Design Collection
- The Industry & Business Collection
- Professions: The Faces and Figures Collection
- The International Symbols & Landmarks Collection
- The Maps and Regions Collection

Each library contains both full screen images and partial screens (Pixes). You can include the entire image, or, using the program's electronic scissors, isolate a single detail from the full screen. You can modify or enhance the images, mix and match them, choose from 64 possible color combinations...you can even set images in motion across the screen using VCN ExecuVision's animation functions.

With the program's extraordinary sketching capabilities, you can create your own visual images! For your text, choose from 10 different type styles, from bold to script, plain to fancy. Every function is offered through the program's easy-to-follow menu selections, making it as fast and simple to use as possible.

VCN ExecuVision is the ideal tool for business proposals, consulting symposia, educational/training programs, marketing plans, management reports, or virtually any other professional presentation.

To see VCN ExecuVision for yourself, visit your nearest computer software dealer. For more information, call toll free 800-624-0023 (NJ residents call 800-624-0024), or return the coupon below.



Mail to:
VCN ExecuVision
Prentice-Hall, Inc.

CC-7/84-CIII

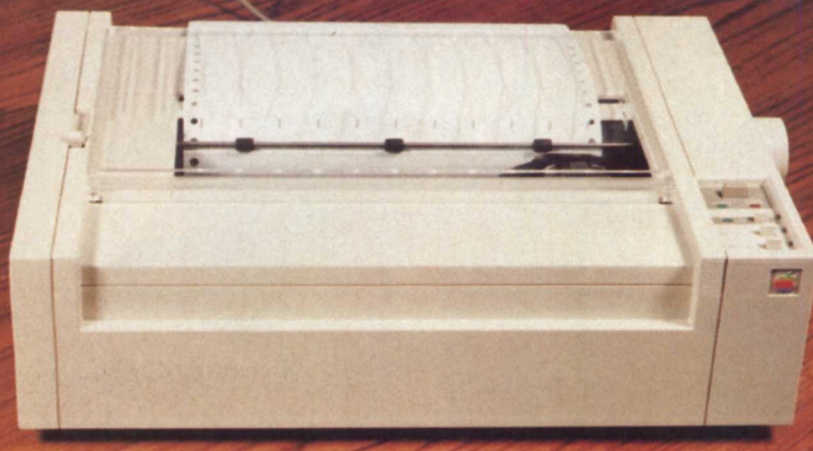
200 Old Tappan Road, Old Tappan, N.J. 07675

I would like to have more information on the exciting potential of VCN ExecuVision sent to the name and address below.

Name _____
Company _____
Address _____
City _____ State _____ Zip _____

VCN ExecuVision is a trademark of Visual Communications Network, Inc., Cambridge, MA. IBM is the registered trademark of International Business Machines Corporation.
© 1984 Prentice-Hall, Inc.

Suggested retail price \$395
Graphics Libraries individually priced \$80-\$90



The Imagewriter makes full use of the Macintosh graphic capabilities.

noise, of course. The Macintosh has four-channel multi-octave sound synthesis capability. This capability can create beautiful music and can certainly be translated into state-of-the-art speech synthesis as well. Macs are bound to become the most talkative microcomputers around before too long.

The Imagewriter

Though in theory you can drive any RS-232 serial printer with a Macintosh, I can't imagine why you would want to do so. The only printer that fully supports all Mac's potential is the Apple Imagewriter. This printer was introduced last year as an accessory for the Lisa and the IIe, but was designed solely to serve as the *de facto* Macintosh printer. In this case again, Apple has insured exclusivity (at least for a time) in its design of the Macintosh printer interface. Until third-party manufacturers decide to create their own Mac-compatible printers, Apple has the market sewn up.

The Imagewriter is a serial interface, impact dot-matrix machine, capable of a top speed of 120 cps. Its vertical dot spacing

is 1/72" minimum, which is very tight. Line spacing is selectable in increments of an incredible 1/144" minimum. The result is crisp and fully-formed looking characters and graphics.

Paper width can run from 3" to 10", and is acceptable in single sheets, roll, or fanfold pinfeed formats. The printer is easy to load, and a special cut sheet slot aids friction-feed applications.

During operation the Imagewriter is relatively noisy, but the machine is totally silent in the standby mode. The ribbon cartridge is quick and simple to change.

Conveniently, paper feed is bidirectional—forward or reverse, without the threat of jamming. The control buttons are well placed and designed for ease of use. You can execute a form feed, for example, then reselect for on-line operation *before* the form feed has completed. When the paper stops, the select light will come on, indicating the printer is back on-line. This kind of attention to detail makes working with the Imagewriter a pleasure.

The unit has three print modes: draft, standard, and quality. Naturally, draft is the fastest, and most closely approximates

the output of the average dot-matrix printer. On the Mac, the standard mode reproduces text and graphics just as they appear on the hi-res screen. In the quality mode, a second pass is made for every pass of the standard mode. This makes the resulting copy darker and, more important, fills in the dots of the matrix for a fully-formed look.

A la carte, the Imagewriter lists for \$695, which is a good price considering its quality and features. However, bundled with the Mac, the unit goes for \$200 less. I am quite sure that most Macs are ordered *with* Imagewriter. To do otherwise at the price would be sheer folly.

Documentation

Macintosh documentation is uniformly superlative. It is colorful, thorough, lively, and fun to read throughout. IBM could take a lesson from Apple on this account. Included with the documentation is a training disk and audio cassette. The cassette is from Windham Hill Records and includes some very mellow jazz piano. Like the Mac itself, the Mac documentation exudes simplicity and class.

As we shall now discover, the Macintosh is very easy to use, just as the documentation is easy to read. The entire goal was to create a system that is powerful, yet utterly painless to use.

Toward a Philosophy of Software

Though the story of the Mac is undeniably a story of hardware breakthroughs, it is just as much a history of solid software effort. The Macintosh is the first piece of consumer hardware to display a defined software philosophy. Before we can truly understand the Mac, we must make a swift digression to grasp that philosophy and trace the software history of the Mac.

Indeed, the hardware technology necessary to bring you the Macintosh is quite fresh. But the basic concepts underlying Mac software are more than ten years

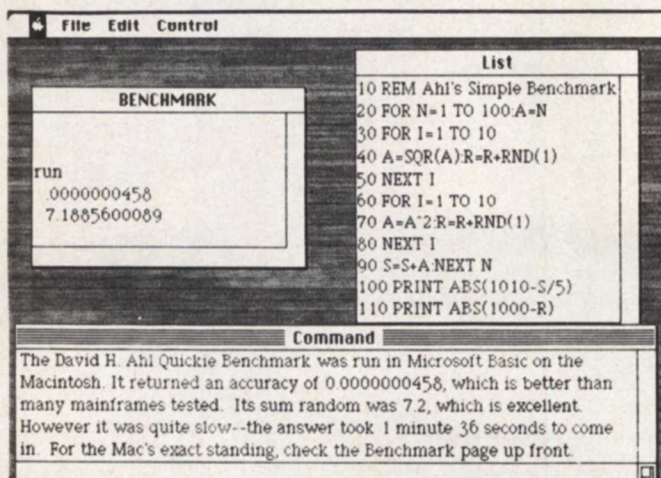


Figure 3. Benchmark program and results.

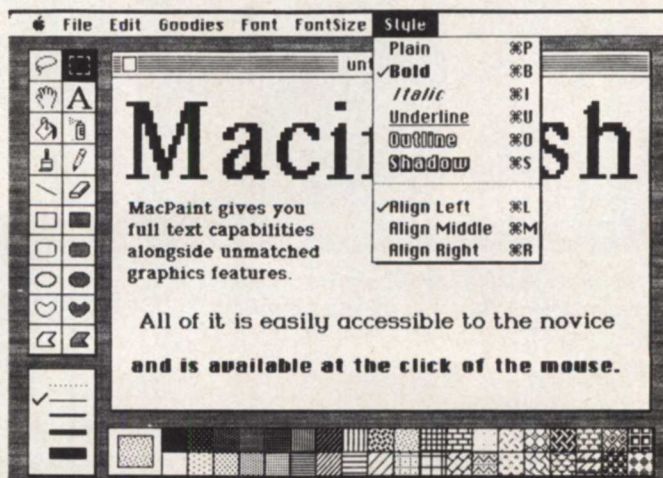


Figure 4. Pull-down menu overlaps Macintosh logo.

BUYING A PASSWORD™ MODEM CAN SAVE YOU UP TO \$250.

AND THAT AIN'T HAYES!*

You can bank on it. Your outlay will be less than if you settle for our major competitor, but not your output! A Password™ modem sends and receives up to 120 words a minute. Provides both 1200 and 300 baud capacity. Offers total interchangeability that lets you transmit information from any make microcomputer to any other make. And your investment is protected by a 2-year warranty.

Unlike our major competitor, Password™ delivers operating simplicity, plus the convenience of uncommon portability. Thanks to lighter weight, it goes almost anywhere. And because of the ingenuity of Velcro™ strips, it attaches wherever you need it, from the side of a desk to the side of a computer!

This means that Password™ doesn't tie you down, and its price won't hold you up. It features auto-dial, auto-answer, and even knows when to disconnect. If you're cost conscious, but refuse to sacrifice high-speed capability and performance, hook up with the right modem—Password™.

The smart decision.

PASSWORD™
by U.S. Robotics, Inc.



1123 W. Washington
Chicago, IL 60607
Phone: (312) 733-0497

CIRCLE 172 ON READER SERVICE CARD



*Based on suggested retail price comparisons of U.S. Robotics, Inc. and Hayes Microcomputer Products, Inc.

old. It has taken until 1984 to realize them in a relatively low-cost machine.

Yet the imagery used in the Macintosh 1984 commercial is quite apt. In the category of software, the Mac is truly an innovator and may actually get its chance to bring down the well entrenched big blue guard. The system software, as well as the two existing pieces of truly finished applications software currently available for the Macintosh, MacPaint and MacWrite, are the direct result of five years of Apple research and development with the Lisa machine and its software. And that research was based on an earlier five years of effort begun and built upon at Xerox PARC (Palo Alto Research Center).

As a result, even the most severe critic might agree that Macintosh software sets new precedents for ease of use. Harnessing the power of formidable bit-mapped graphics resolution, along with mouse pointer technology, the user is guided through available functions using three

main methods: the icon, the window, and the pull-down menu (Figure 4). All rely on the mouse pointer peripheral, rather than the keyboard, for input.

Icons are pictures that represent ideas. On the Mac, a disk is depicted as a small picture of a disk. Deletions move into a small garbage can. Word processing documents appear as tiny typewritten pages. Graphics documents appear with tiny paintbrushes on them. Systems programs take the form of mini-Macs.

Now if we assume that a computer user knows how to read, which may or may not be a safe assumption, why use icons when you could just as well spell things out? Well for one thing, there is an immediate spatial recognition of icons, and as lexical cues are used alongside them, the icons act to help the system work more "intuitively."

Want to "throw something away?" Use the mouse to pick it up and put it in the garbage can—it's that simple. Point, click,

reposition, click. And until you "put the garbage out," you can go back into the can and retrieve anything you have put there.

Windows are just that: they are movable, re-sizable viewports into documents, applications, and functions. Multiple windows can be opened and closed, stacked on the screen, then selected with the mouse. They can be tailored to sit side by side or one on top of another. You may choose to keep your desk as clear or as cluttered as you want it to be.

The idea here again is to make things work more intuitively. The more the computer can appear as an actual "electronic desk top," the easier it will be to use. Windows allow you to "shuffle papers" just as you would on an actual desk. In fact, there is probably a correlation between the messiness of a user's real life desk top and his Macintosh desk top.

Pull-down menus make choosing command functions as simple as possible. A

Mac Microsoft Basic

Abigail Reifsnnyder

Those of us who have had our Macs for a while have been champing at the bit for more software—one can only do so much with Macs Paint and Write. So it was with much excitement that I opened my copy of Microsoft Basic for the Mac. I soon discovered that Microsoft Basic for the Macintosh is just that: Microsoft Basic—a strict translation whose two best features are that it is Microsoft Basic and that it is out, but whose most remarkable feature is that it does practically nothing to take advantage of the special capabilities of the Macintosh. Sure, it has windows; sure, it uses the mouse; and, yes, it does include commands to let you access the Macintosh ROM routines. But there is more to the Mac than windows and mice.

When you first call up MS Basic, you see the familiar menu bar at the top of the screen, an empty "untitled" window, and a small command window at the bottom. The command window is where you type in commands while the output window displays everything you type in exactly as you type it along with the results of your program as it runs.

The menu bar includes the standard Apple menu with the desk accessories and three MS Basic menus: File, Edit, and Control. The File menu includes six (not three, as indicated in the manual) commands that act on program files: New, Open..., Close, Save, Save as..., and Quit.

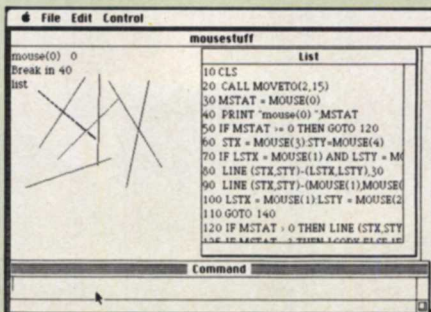
All of these commands operate in much the same way as they do with MacWrite and MacPaint, warning you in "dialog boxes" if you are trying to do something that will cause you to lose the current file. The one exception to this is the Open... command which expects you to remember the name of the file (or the name of another disk) you want to open. (In both MacWrite and MacPaint, all the files on the disk are listed alphabetically in the dialog box.) The Edit menu allows you to Cut, Paste, and Copy—but only one line at a time. (There is no full-screen editing, but more on that later.) Finally, the Control menu has seven commands that control program execution and output: Stop, Continue, Suspend, List, Run, Trace on, and Trace off. These functions can be invoked from the command window or through keystroke commands as well as from the menu.

You may also call onto the screen up to three List windows where your code is

displayed; you can scroll through using the scroll bar at the side of the window. The advantage to having three of them is, presumably, to facilitate comparisons and cutting and pasting among different parts of a program. The usefulness of this feature is limited since you can edit only one line of code at a time; if you want to move a block of code, you are better off just re-entering it. Perhaps, if you were able to run two or more programs simultaneously, this feature would be more useful for comparisons. As it is, it seems to be merely a bell or a whistle, take your pick.

This version of MS Basic does have some special features such as LINE and BOX statements, mouse functions, and double precision variables. GET and PUT statements are especially powerful in this version of Basic, since they allow you to store a screen graphic into an array that can be put anywhere else on the screen. This facilitates such things as dragging a picture around the screen and creating the effect of animating an object. The mouse functions make it easy to write programs that respond to mouse inputs (mouse position, single click, double click and drag).

Unfortunately, these new features do not compensate for the slap-dash feel of this implementation of Basic on the Macintosh. It could be much more than this. Not having a full-screen editor to edit source code undermines the advantages of both the windows and the mouse. In fact, the program works in such a way that the mouse is more annoying than helpful. Another particularly glaring gap in the capabilities of this Basic is the lack of any commands to address the four sound channels of the Mac. (Someone forgot that computers can make noise!)



List window displays portion of simple program which accepts mouse input.

list of command headings appears on the ruler at the top of the screen. Each heading indicates a category of command. By pointing the mouse to a heading, then pressing the mouse button, the available commands under that heading "pull-down." You may then scroll down through the menu. When the mouse highlights your choice, you let go of the button and that command is implemented.

And folks, take it from me: one pull-down menu is worth a thousand modes.

Mode Indigo

Socrates' wisdom cannot be responsibly challenged, and his statement concerning knowledge and ignorance certainly applies here. The simpler we can make a tool, the more the uses to which it will suggest itself. But perhaps we can take the advice even a bit further. Perhaps true wisdom comes by sifting the *pertinent* facts from the *impertinent* facts.

Impertinent facts are a distraction from

the knowledge at hand and detract from insight—detract from clarity in the expression of what we *do* care to know. For a pertinent example, we might consider the concept of "modes" in conventional computer software.

In a typical word processor of any real power, there are multiple command modes, each with its own set of subcommands. To make even the simplest change to existing text, you must know all about available command modes and how they work. Every minute of the sidereal day someone makes a mistake on a computer and mutters some variation on the line, "Shoot. Wrong mode."

Or consider the idea of embedded command codes. As we scroll our way through life, we insert numerous tiny monstrosities like .pa and .np and .ul into our text, and accept these as commonplace, necessary evils. They are not English. They have nothing to do with the actual matters at hand. Yet they are frequently the root cause of wasted revision time, i.e., "Shoot. It should have indented there, but I forgot the period in front of the .pa code."

Parochialists wonder what the problem is with modes. Sure, they require real effort to understand, and nothing about them is in the least bit intuitive. But effort is what separates the wheat from the chaff, right? The men from the boys. The smarties from the dummies. If you can't learn about modes, then maybe computers aren't for you.

Understand?

Certainly some users would prefer to be perceived as micro-Merlins. Perhaps the more cryptic a command code, the better. This category of user perceives the eventuality of real democratization of computer power with something akin to melancholia.

Imagine how depressed the very first auto owners must have been when the Model T started popping up everywhere. It became harder to feel superior.

But the fact of the matter is that even for those of us with the faculties to comprehend cryptic command codes and modes, the way of icons, windows, and pull-down menus is a better way. We do not care to waste time reminding ourselves that CTRL-D deletes in the insert mode but implies a DOS instruction in the command mode. These are impertinent facts—facts we are the *more intelligent* for being without. We are much better served when thinking about an *application* itself rather than about the applications program that frames it.

A Four-Year-Old Can Understand

The notions of the pull-down menu, adjustable-sized window, pointer-based icon system, and document "stacking," are generally credited to Alan Kay, founder of the Learning Research Group at Xerox's

Palo Alto Research Center. (Kay has spent the last two years at Atari, but shortly before press time announced he was leaving to join Apple computer. One can only imagine what this alliance may foster.)

Kay's great leap of faith was to embrace Socrates' principle—to embark upon the design of a computer that could be learned, and then productively used, in minutes.

To put the case more clearly, Kay's ideal was to design a computer that a child could not only use, but *want* to use. Kay knows that adults will put up with all sorts of bilious gobbledygook in order to work with computers. A child will not. He will either produce real results without formal training, or he will lose interest and walk away.

And so at PARC, and later at Apple, development progressed on a computer system so straightforward, so intuitive, that adults and children would not only comprehend, but embrace it.

What is all the ballyhoo about the Apple Macintosh, you ask? Why the hue and cry? Why the excitement over this crazy-looking little beast? I have tried to explain, but it would be best if you got yourself to a Macintosh sometime soon. Give yourself a half an hour, and you will then have a better idea of what the power of the machine truly is.

If, after a session with it, you *still* have no concept of what makes the Mac the most promising computer introduction of the '80s, don't despair. You have simply been sitting in the blue glow of the Orwellian viewscreen with the other drones for far too long. Get yourself a four-year-old child, and ask him to fill you in.

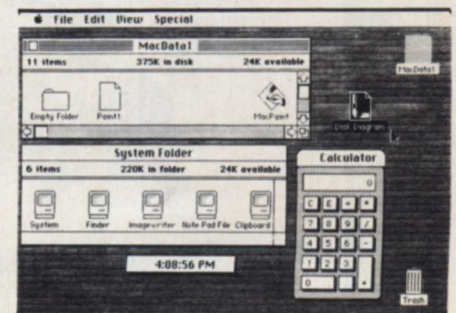
But there we go with that word "promise" again. Better be careful. For as it stands, the Macintosh is a more powerful machine for what it *promises* than for what it delivers.

Let us now examine exactly what it does deliver.

Systems Software

The following program is provided on the systems disk:

- **Finder.** A document management system that allows creation of new documents, opening, closing, copying, renaming, and deleting of existing documents, appli-



Display of some systems functions.

cations, and files, and movement of same on or between disks and folders. Folders allow documents to be arranged hierarchically. Finder allows you to obtain directories by icon, name, date, size, and kind.

The following systems functions can be called up during Finder or any other application, and concurrent with each other:

- **Calculator.** Looks, and works, just like an actual calculator. Results can be cut and pasted into other documents or applications. Numbers can be entered from the keyboard, numeric keypad, or using the mouse to point and click screen "buttons."

- **Clock.** Shows the current date and time. You can copy the date and time to paste into other accessories or documents. You can also set an alarm function.

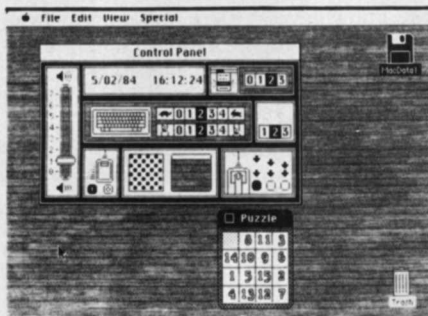
- **Key Caps.** Allows you to use the mouse to enter text. Its real utility is to display available special graphics characters obtained by holding down the OPTION or SHIFT key.

- **Puzzle.** A pure bit of whimsy. Something to play with when you need a break. A sliding tile puzzle simulation that will take you back to your childhood. Documentation quote: "unfortunately, you can't pry out the little plastic tiles when you get frustrated."

- **Note Pad.** A place you can jot down a few notes and keep them separate from the document you are working on. Or type text and edit it even if you are using an application that doesn't allow for text editing. Using the cut and paste option, you can move text from the notepad to a document or application.

- **Scrapbook.** A place to keep pictures and text you use frequently. This might include your letterhead or even a "moused" version of your signature. A graphic equivalent to the text storage of Note Pad.

- **Control Panel.** Lets you set system defaults, including speaker volume, date and time, blink rates, key repeat rate, keyboard touch, mouse sensitivity, mouse



The Control Panel allows the user to configure Mac defaults.

double-click speed, and desktop graphics pattern. Most control pattern settings are remembered even when the system is powered down.

The following packages are offered free for a limited time to the Macintosh purchaser:

- **MacPaint.** The most powerful monochrome graphics system ever offered on a microcomputer, MacPaint is the showcase program for the Macintosh and currently the best available demo of the capabilities of the machine. It gives you a set of tools (Figure 5) that allows you to create sophisticated screen graphics in seconds. Contrary to the opinions of some reviewers, I believe MacPaint does provide dramatic new abilities even to those who lack underlying skills. Perhaps you literally "cannot draw a straight line"; the Mac will make sure the line you draw is straight. I have been needing a tool like MacPaint for a very long time, without even knowing it. Now in 20 minutes I can create charts and diagrams that would have been scrubbed before the Macintosh appeared because of the time and effort they would have required.

MacPaint is an image processor that handles images in the way that a word processor handles text. Its resolution is extremely good. Figure 6 is an example, drawn in about 40 minutes by Karen Brown of our typesetting department. Figure 7

took her about half that time. Total effort was nearly an hour.

As a graphics aid, MacPaint is a serious tool. And as a toy, it is exquisite. It is the ultimate executive doodler.

- **MacWrite.** The ultimate "see what you'll get" word processor. Easy to use, yet powerful. Does most things you might expect, including moving blocks of text, find and replace, line spacing, headers and footers, centering, margins, page numbers, justification, tabs, and decimal tabs.

In addition to the expected functions, MacWrite has some special functions all its own.

For starters, what you see on the screen is exactly what the finished document will look like. There are no embedded codes. Because even the "text mode" of the Macintosh is entirely bit-mapped as hi-res graphics, you can look at the CRT and see the printed page.

In addition, you may choose between multiple fonts, multiple point sizes, and multiple style options including bold, italic, underline, and "shadowed" text. If and when you choose to reformat a document, changing a margin or line-spacing, the document reformats right before your eyes on the screen. There is no guesswork with MacWrite concerning the look of the hard copy. If you are coming from a word processor that would print an entire document underlined because you forgot a single closing underline control character, you will find MacWrite an extremely refreshing development.

All text selection functions are performed by the mouse. Position and click, then move through the text you want to mark and it will automatically be highlighted. Position and click. Now you can cut and paste, move, delete, copy, change font, point, or alter typestyle of the selected text.

To change formats within a single document, you simply insert a new ruler, reflecting the format change. If you wish then to return to the original format at a

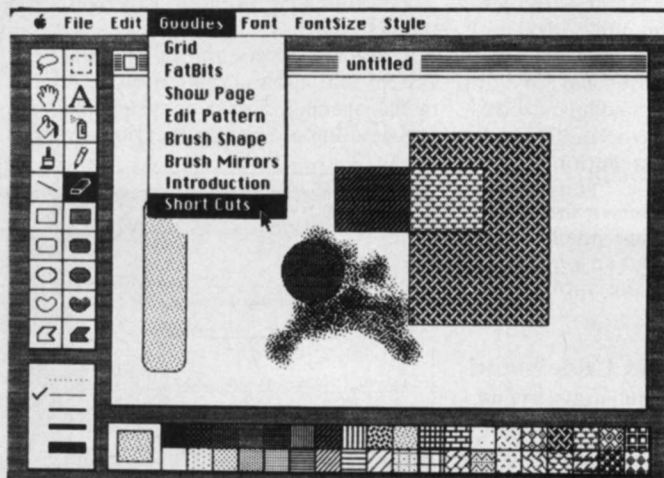
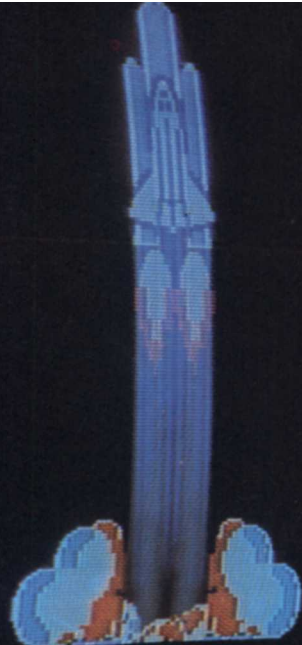


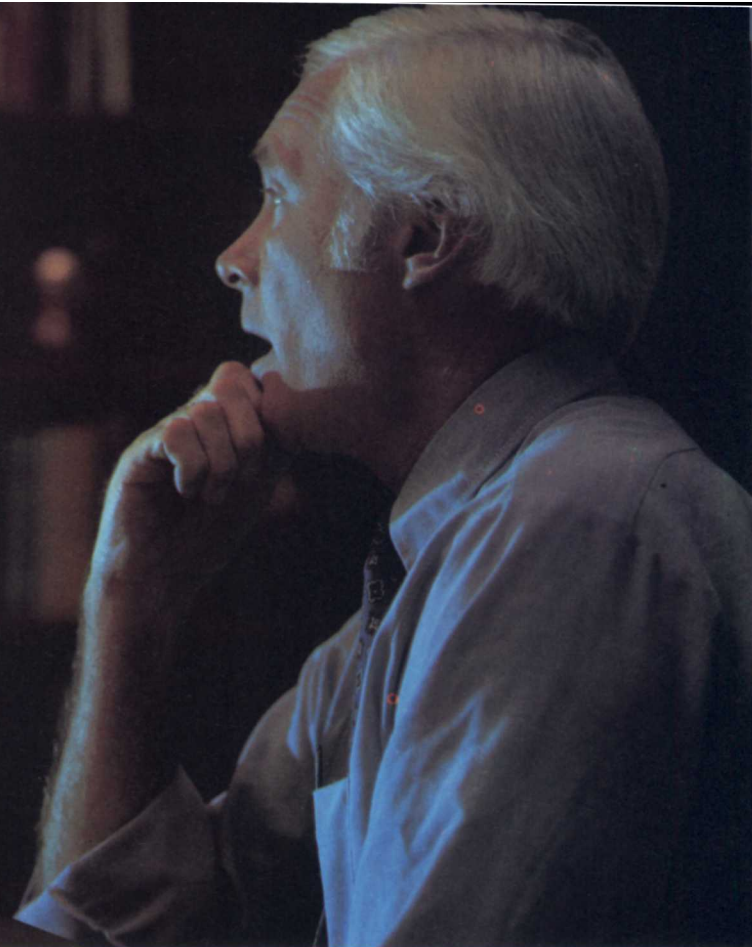
Figure 5. MacPaint palette.



Figure 6. Single portrait manipulated by MacPaint.

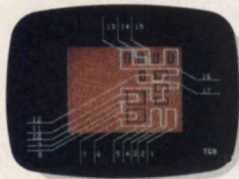


New TGS Version with Special Free
Expansion Module works with KoalaPad™
and Gibson Light Pen™



THE GRAPHIC SOLUTION

Solve your toughest communication problems with the Graphic Solution™, a sophisticated, new graphics package from Accent Software.



With precise, multi-speed ANIMATION create captivating sales presentations and product demonstrations that will both intrigue and inform your clients and customers. Watch their reactions; you'll see your messages getting through.

Develop educational materials and training aids that MIX TEXT AND GRAPHICS on the screen, breathing new life into abstract, hard-to-grasp concepts. Mix programs too. Images can be displayed on back-grounds loaded from any of your other programs. Construct custom TYPEFACES AND TYPESIZES to balance the visual elements.

Tired of run-of-the-mill business graphics? Change standard charts and graphs into colorful THREE DIMENSIONAL PERSPECTIVES. Add text and animate the data to show the



relative rates of change for your most important information. Like cash flow projections. Or revenue estimates.



Plot flowcharts, time and motion studies, industrial process flows with COLOR-CODED ELEMENTS highlighting critical paths. Animate the sequences to show how flows actually progress.

Work with live action? Prepare film and videotape storyboards using the unique FRAME-BY-FRAME graphic sequencer that lets you create and animate a video story before shooting.

Whatever your graphic communication demands—in the business world, the arts, industry, education—The Graphic Solution™ at \$149.95 has the answer. Take a hard look at The Graphic Solution. You'll like what you see.

The Graphic Solution requires a 48K Apple II with ROM Applesoft and DOS 3.3. See your local dealer or send \$10.00 for a demonstration diskette to:



ACCENT SOFTWARE, INC.

4546 El Camino Real, Suite S. Los Altos, Calif. 94022, Telephone 415-949-2711

Apple is a registered trademark of Apple Computer, Inc.

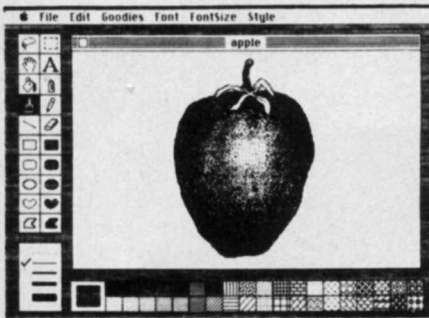


Figure 7. A MacPaint original.

later point in the document, simply copy and paste the original ruler itself at the point you desire.

You may also paste graphics created with MacPaint directly into MacWrite files.

Other Announced Software

In addition to these two already released packages, Apple has announced the following packages for release soon:

- **Mac Terminal.** A terminal communications package for the Macintosh.
- **MacDraw.** A business graphics package.
- **MacProject.** A project management system for supervisors.
- **Macintosh Basic.** Apple's version of the popular programming language will allow a program trace to run alongside a listing in one window, while the program itself runs in another.
- **Macintosh Pascal.** Apple's Macintosh Pascal will be interpretive rather than compiled, which may make Pascal a popular Mac programming environment.
- **Assembler/Debugger.** What every 68000 aficionado is waiting for.
- **Macintosh Logo.** Announced for release in the fall.

Microsoft has announced several Macintosh packages for imminent release, and Microsoft chief Bill Gates has voiced a serious commitment to support of the Macintosh machine. We wanted to get a look at Macintosh *Multiplan*, the popular linking spreadsheet package, but no release copy was available at press time. We did manage a look at Microsoft Basic for the Mac (see sidebar). Other packages promised by the company are *Chart*, a business graphics package; *Word*, a word processing program; and *File*, a database management system.

There is that word again—*promised*. We were promised a copy of *Multiplan* nearly two months ago and have yet to see it. That sometimes happens with promises; they get broken.

Taking the Bads with the Goods

The astute among you may have detected by now that I have been storing up my criticisms of the Macintosh—holding them in abeyance until the full complement of Mac "goods" was laid before you. It

should be obvious to you now that the Mac does represent a significant breakthrough, both in hardware and in software.

It should also be clear that the true concern is whether the machine will live up to its undeniable promise.

Fine. It is now time to lay out the "bads."

• **The Macintosh does not have enough RAM memory.** To those of us used to 48K and 64K machines, 128K may sound like plenty. But that is a rather misleading statistic. Between the video display, operating system, and an application like MacWrite, when booted, you are left with little more free RAM than a typical Apple IIe.

The answer we have heard regarding this complaint is that when 256K RAM chips become available, you will be able to upgrade your Macintosh to 512K. This is a promise that will undoubtedly be fulfilled. The question is *when* 256K RAM chips will become available, and how much they will cost. An optimistic guess might be Christmas or so, but you never know. We are depending on the Japanese to provide us with plentiful 256K technology.

As for cost, well, chips are expensive when they're newborn. At the outset, 256K RAMs might cost upwards of \$80 apiece. That would make the Mac memory upgrade quite a costly one. And who knows what Mac owner demand might do to RAM chip prices?

The bottom line on this point is that it might be two years or so before you can inexpensively give your Mac enough RAM to be truly useful. And it is possible that large-scale software development for the Mac will be stalled until 512K systems become standard.

• **Single microfloppy storage is slow and inadequate.** One arena where Apple has not fared well of late is in custom drive configurations. Sony drives on other systems run quickly and silently. That is why I was surprised that the single-drive Mac system is so slow and cumbersome. Creating a new startup disk seems to take an eternity, and repeated disk swaps are the norm.

As with the RAM situation, 400K storage is a misleading figure. The operating system takes up fully half of that, and a typical application program, such as MacWrite, another 50K. That leaves little more free disk space than on the typical Apple IIe drive.

External disk systems will not be available for some time, as the limited supply of existing Sony drives must be earmarked for new Macs. And even the availability of the external drive will not transform Mac storage as dramatically as one might hope.

The best answer to this problem is the promise of the Sony double sided drive. This could become the default external drive system, to be used in conjunction

with the existing single sided internal drive.

Certainly some type of hard disk will play a big role in the Mac's future, and as all software applications we have seen so far have been released without copy protection, application programs could be moved over to hard disk easily. Davong has announced a third-party Mac Winchester drive for release soon.

I must also register displeasure with the disk ejection procedure. To remove a disk from the drive, you must close everything down, quit your current application, and request an eject from systems software. I understand that this procedure is for my own protection, but it is a drag. In a way it reminds me of 1975 cars. Remember those? They wouldn't start unless you had your seatbelt fastened.

Everybody ended up hot wiring them to get around the interlock—even people who wear seat belts. I can just imagine a pile of unbent paper clips sitting in front of every Macintosh in the nation.

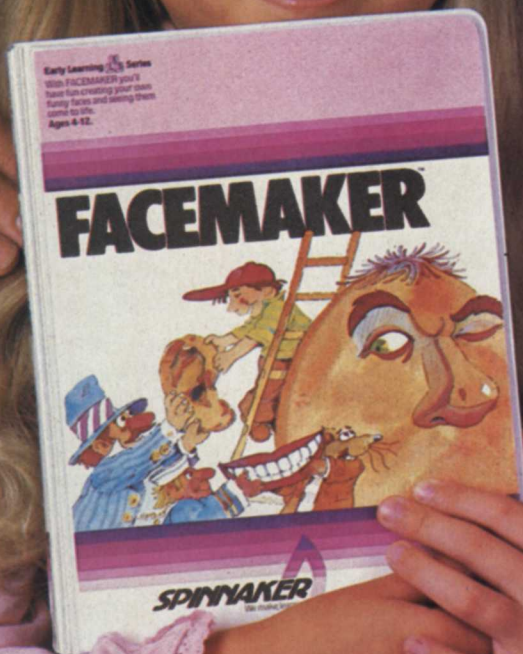
• **There are no internal expansion slots or external expansion busses.** What's the big deal about that, right? The Mac already has everything you need. Well you might have said the very same of the old Apple II back in 1977. So many expansion slots, way back when there was no firmware to plug in them. That situation changed quickly. Nowadays many Apple owners wish they had another three or four slots. By precluding easy hardware expansion on the Mac, Apple writes off a major component of its early success—expansion flexibility. Sure, it might take some imagination at first to envision the kinds of cards the Mac might need. But if an expansion bus were available, people would start to invent them.

On the same score, it is lamentable that the Mac does not sport an internal modem standard (or at least the capacity to add a modem internally). The circuitry is much less expensive than it typically sells for and is certainly compact enough to have fit inside the Mac. To charge an extra \$300 for the external Mac modem almost suggests—I shudder to say—tactics typical of Apple's main competitor.

• **MacWrite has some severe limitations.** Although MacWrite has some very refreshing features and is a joy to use overall, it is not a serious word processing tool. Part of this relates to the RAM and disk storage shortage of the machine. I was flabbergasted to discover that the 128K Mac is capable of supporting MacWrite documents no longer than 10 pages in length. After it reaches the last available byte, it will accept not one more character. And to make matters worse, document files cannot be chained.

Other problems, however, will not be remedied by a simple RAM upgrade. Lack of directional cursor keys, for example, was to my mind a major omission. I under-

NOW AVAILABLE FOR
COLECOVISION
AND
**COLECO
ADAM**



Finally, computer games you want your kids to play.

Spinnaker makes computer games kids love to play. But some of our biggest fans are parents.

Because on top of all the fun and excitement, our games have something more. True educational value. They help develop a child's learning skills, in all kinds of fun ways.

So Spinnaker games aren't just computer games. They're Learning Games.

They're written by top educators who know how to make learning fun. And by expert game programmers, who use colorful graphics, animation and sound to make our games so exciting, your kids may not even realize they're learning. They're having too good a time!

That's why children love us. And parents love us. And why we're already the leader in the field of home educational software.

So if you're looking for computer games that you'll like as much as your kids will, look for Spinnaker **Early Learning Games** (ages 3-8) and **Learning Discovery Games** (ages 6-12) at your local retailer.

Spinnaker. We're giving computer games a good name.



SPINNAKER
We make learning fun.™

Disks for: Apple,® Atari,® IBM® PC and PCjr and Commodore 64.™

Cartridges for: ColecoVision,® Coleco Adam,™ Atari,® IBM® PCjr and Commodore 64.™

New Grist for the Mill

Arlan Levitan

Aside from all of the conjecture by professional micro watchers about whether the public, computer dealers, software houses, and businesses are ready for a machine as radical as the Macintosh, there was one sector of the industry that was well prepared: The Rumor Mill. The first Macs had no sooner been barely burned in by their new owners, than the Mill embraced the new machine and went into full production.

The undisputed leader in the rumor race is system memory. Tales abound about late year introduction of a "Fat Mac" with 512K of memory. Although perfectly serviceable, the present 128K system does present some limitations, particularly in a single disk drive configuration. Swapping disks during the process of back-up upwards of 20 times is nobody's idea of fun and games and takes at least five minutes per disk, even for the most fleet-fingered user.

Additional memory will aid more than just disk duplication. Although a fairly straightforward memory management system allows programs whose total size exceeds memory to run on 128K Macs, execution is slowed considerably by the amount of disk access involved in such operations. More RAM will significantly speed up the execution of programs that rely on overlays at this time.

To top things off, Mitch Kapor of Lotus Systems has flatly stated that their "1-2-3 like" product for Mac that will hit the streets late this year or first quarter of '85 will require 512K to run at all.

The culprit here is ol' Adam Smith's law of supply and demand. Apple intended the Mac to be released as a 512K machine, but industry predictions of the availability of 256K dynamic RAM chips fell short of the mark, and as a result, type 41256 RAM chips still command prices of \$60 to \$85 apiece. Since the popular 4164 series 64K chips are going for \$5 or less these days, don't expect to see Fat Macs floating around in quantity until 256K chip production is well ramped up and prices fall to at least half of their current level.

Apple has maintained a generous attitude toward upgrades for its installed base of users in the past, and their Mac minions will be no exception. Loose talk in the most popular watering holes of Cupertino pegs the cost of a 128 to 512K upgrade at about \$700. Since the Mac memory chips are soldered directly to the system board,

the upgrade will consist of a complete system board swap, with the old boards being returned to the factory for retooling. Do-it-yourselfers would be well advised to leave such an upgrade to their local dealer. The system board is a four-layer affair, and even Mr. Wizard would have a hard time not bungling that amount of delicate solder sucking and re-installation.

Second place in the rumor sweepstakes goes to the introduction of double-sided drives with 800K total storage capacity as soon as Sony can supply them in quantities in line with Apple's requirements. Best guess on availability at this point is early 1985. Even more interesting are claims being made by some hardy souls, who have pried open their Macs to poke around inside, that with a simple retooling of the Mac faceplate there is just enough room to cram two disk drives instead of one in the system unit itself. Sources at Apple refused to deny the possibility of such a move in the future.

Expect to see third party external drives competing with Apple's own \$500 add-on by mid summer at prices that may force Apple or its dealers to cut at least \$100 off the selling price.

RPN (Reverse Polish Notation) operation was dropped as an option on the Finder's Calculator at the last moment. Don't believe it? Check out the calculator on the Guided Tour disk.

A new release of the *Finder* is reportedly in the works and will be ready to be shipped by Fall. Finder updates will require a trip to your dealer.

If you think that students purchasing their systems through the Mac College Consortium program are getting a bargain, the sales people at your local Apple dealer are said to be getting an absolute steal through a program called Own-a-Mac. Absolutely unimpeachable sources tag complete systems consisting of a Mac system unit, Imagewriter printer, MacPac carrying case, MacPaint/MacWrite, Microsoft *Multiplan*, and a box of ten disks at an otherwise unbelievable \$1100! Looks like Jobs and company are taking no chances in generating a high degree of sales force enthusiasm.

To round things out, an extremely high-resolution RGB color monitor version of Mac is said to be in the wings for spring 1986. By that time 512K black and white Macs with double-sided internal drives will be going for less than \$2000. Price of the Rainbow Mac is rumored to be currently targeted at \$2995. But why wait two years when you could be Mac'ing around right now.

stand and appreciate that the mouse is quite capable of handling this input for me. But when all I wish to do is move the cursor to the lefthand margin and up six lines, I would like to do it without having to remove my fingers from the keyboard.

Many application functions on the Mac make use of "expert keys" to allow shortcuts through nested menu selections. My general understanding of pointer philosophy has always been to offer a choice. *Both* means of control should be constantly available, so that the decision of how to input is left to the user. To have eliminated keyboard cursor movement entirely from MacWrite is in my opinion a flagrant example of mouse chauvinism on the part of Apple.

MacWrite will not calculate a word count, has no spell-checking, merge, or hyphenation capability, and will not allow a column width wider than 80 characters.

In short, MacWrite in its current form is too limited to be of real use to anyone who does a lot of writing.

• *The system is monochrome-only.* Despite rumors to the contrary, (see sidebar) the Macintosh is likely to remain a black and white system. The circuitry to drive a color printer is already in place, but don't bother holding your breath for an ultra-hi-res RGB tube to replace the current Macintosh CRT.

• *MS-DOS compatibility is ruled out.* As I have said many, many times, though MS-DOS may be a mediocre standard, it is a standard nonetheless. Apple has decided to challenge IBM on this and could not have started off on better footing than it has with the Mac. But if it is IBM compatibility you have in mind, don't look to the Mac. If you must have an IBM-compatible Mac, you can buy a Compaq and plug it into the same power strip.

• *The Macintosh will not multitask.* I mention this not as a criticism, but because it is a fact largely overlooked by Mac reviewers. The main difference between the Mac and the Lisa is that the Lisa can run more than one program at a time. Not so the Macintosh. You may open multiple document windows from MacWrite or from the Finder. But whatever multitasking abilities the Mac finally inherits will come from cleverly designed software modules—not from within the Mac itself. It is a tribute to Apple's marketing that this fact has remained so obscure.

• *You can't use a Mac away from a desk.* Unless you have a place to do your pointing, you won't be going very far with your mouse. It would be nice if Apple or a third-party company were to offer a MacBall trackball, so that the Mac could be used in bed, reclining on the couch, or in the back seat of a Buick. Our artist/typesetter Karen Brown said she would have preferred using a graphics tablet to compose her drawings. Perhaps Koala

Technologies will remedy this situation shortly.

• *MacPaint has an easel size limitation.* The screen window cannot be re-sized from MacPaint; it presents a 4" x 6" window on an 8 1/2" x 11" page. It is still quite possible to draw shapes larger than the window size, but the process may seem disjointed and cumbersome.

• *Forget about external video.* Because of its non-standard ultra-high resolution, there are no plans to offer a larger, external Mac monitor. The lack of an external video connector jack bespeaks this. I feel this may change as the Mac enters college classrooms, however. Having taught my share of microcomputer courses, I can vouch for the tremendous help a second monitor can be when 40 students all need to see the same screen at the same time. With the Mac going into colleges and universities nationwide, a remedy to the external video restraint may be forthcoming.

• *Macintosh software development is an involved process.* Although many interface aids are offered in ROM, development and debugging of Mac programs is currently slow going. Witness the delays from even the largest and smartest software houses around. Because the Mac strives for such high standards, it calls for the absolute most from the absolute best. As a result, it is unlikely that Macintosh software packages will flood the market before the end of the year.

I have never criticized a new machine for the lack of software. When the IBM PC came on the scene, there was literally nothing available for it but a buggy word processor. The Macintosh debuted with MacWrite and MacPaint, both of which have been thoroughly debugged, and these programs promise an unbeatable standard of software quality.

Closing Arguments

I simply wonder if this standard can be upheld. The thought first occurred to me as I played around with Microsoft Basic. A Basic program running on the Mac looks very much like a Basic program running on any other machine, except for its windows. Without the icon/window/menu shells, the Mac is reduced to a rather average machine.

It is up to talented programmers to make the most of Macintosh ROM in every program they develop. With it they can meet the ambitious promise that is the Apple Macintosh. Otherwise the Mac may never develop the staying power it needs.

We are still quite some distance from the ideal machine Alan Kay envisioned back in 1971 and christened the "Dynabook." This is a computer the size of a Model 100 with the power of a hundred Macs. In a recent interview, he rather cynically predicted that it would be the

Japanese who would make the Dynabook a reality. He told Allen Munro of *St. Mac* magazine that the Macintosh was in point of fact "no big deal."

That's the problem with people who are vastly ahead of their time. The times never seem to catch up. The Mac clocks in at 8 MHz, but Kay is already imagining what he could do with 12MHz. In my last vestiges of prideful nationalism, I only hope it is Apple, not NEC, that introduces a 1000K 12 MHz machine two years from

now. Perhaps I will write about it using a truly professional word processor running on a 512K hard disk Macintosh.

Of course Kay will still be cranky with it, even when it does happen. If only he had 20 MHz and 5000K in a case the size of a box of Milk Duds. Then he could really make things happen.

Well if anybody can pull off *that* kind of miracle, it is probably Apple. Those folks show a lot of promise.

CIRCLE 400 ON READER SERVICE CARD

Data worth keeping deserves a Data Defender.



Data Defenders by Ring King. They're the finest quality protection you can buy for the information you have stored on 5 1/4" mini-diskettes and printout.

The Ring King 070 Tray holds 70 mini-diskettes in a tough copolymer shell with security lock. The Ring King Flip File II binder holds 20 mini-diskettes and converts to a desktop index. Ring King Looseleaf Files are punched to fit standard 3-


ring binders. Ring King Data Binders hold up to 8" of 8 1/2" x 11" or 14 7/8" x 11" unburst printout.

Ask for Ring King Data Defenders at your computer supply dealer. Or send for our free, full-color catalog of computer support products. Write Ring King Visibles, Inc., 2210 Second Avenue, P.O. Box 599, Muscatine, Iowa 52761. For customer service, phone (800) 553-9647, in Iowa (319) 263-8144.

DATA DEFENDER™



CIRCLE 168 ON READER SERVICE CARD

 **commodore**

Take your Commodore 64
out of the Toy Box.

Superbase 64

The natural development for Commodore 64 users

If you want to unlock the full potential of your disk-based Commodore 64, you need Superbase 64 – the complete records-handling system that puts business-style power and practicality at your fingertips.

Invoices/Finance & Banking/Membership/
Collections/Recipes/Personal Filing/Inventory/
Prospects/Management Accounts/Home Finance
Records and many, many more!

Superbase™ 64 solves a host of filing problems with its easy record formatting, powerful indexing and sorting, extensive outputting options, and its Extended Basic programming capability.

And Superbase 64 comes with a simple-to-follow manual and operators tutorial so you'll have no trouble getting the benefits straight away.

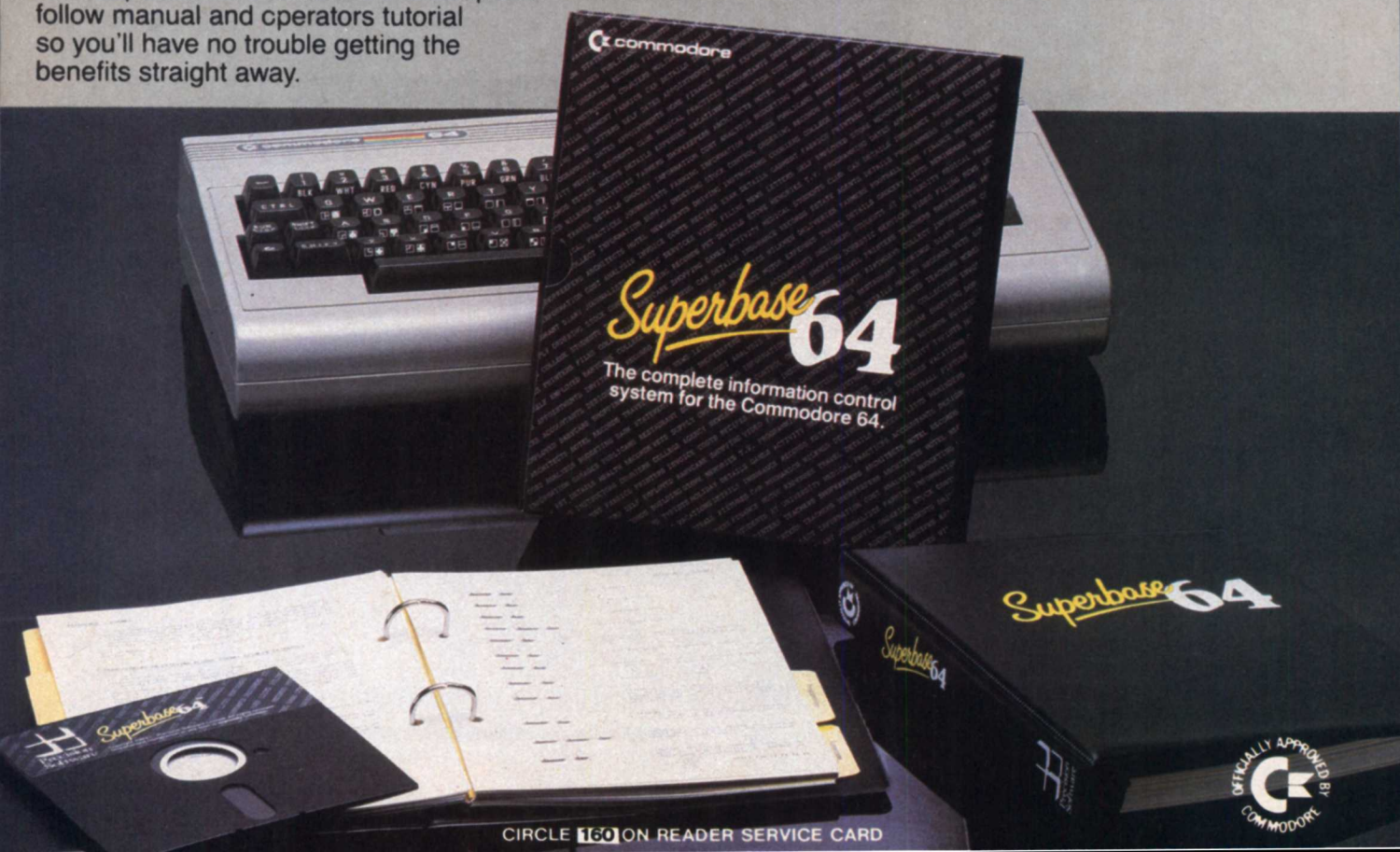
Superbase 64 – The complete information control system for the Commodore 64.

From the authors of Easy Script & Easy Spell



**Consumer Products Division
Precision Software (USA), Inc.**
Suite 1100, 820 Second Ave.,
New York, N.Y. 10017
Tel: 212-490-1825

More information is available from your dealer or from
Precision Software direct.



CIRCLE 160 ON READER SERVICE CARD



Inching Closer to the Perfect Portable

Hewlett Packard

HP 110

The kinds of tasks to which men and women have assigned computers have always been related more directly to the size of the computer than to the size of the task. Sure, you can't solve differential equations in 1.5K (spare me the letters, I may be wrong). But I am speaking of size here as *proportion* as opposed to *power*.

On the one extreme: the mainframe the size of a nuclear submarine. Impressive, but hard to love. On the other, the credit card calculator. Cutest thing you ever saw, but rather limited.

I play from time to time with a Sharp PC-1250 handheld computer, and it is fun to see just how much code I can cram into 1.5K. But the machine doesn't have a whole lot of utility in the real world. Its tangible contribution was to help set the stage for more powerful and more refined miniaturization.

Despite the current limitations of most portable machines (and I mean by this term internally powered "notebook computers," not the Hernia-1065, which OEMs sewing machine cases from Singer), the category has managed to catch on. Perhaps we should pause to reflect for a moment on why this is so.

The Mind Appliance

What *can* computers do, anyway? What good can they do for actual human beings on a day-to-day basis? That is the question that portable designers are attempting to answer, and the better the answers they give, the more portable computers they can sell. People have begun to realize that having a computer tag along with them is quite a helpful concept. There is no certainly no threat in a plastic computer the size of a dictionary sitting on your airline tray table. It zips into a carrying case just like your toiletry kit, and you are much more likely to hurt yourself with your razor.

Since May of 1983, I have been raving about a portable computer called the TRS-80 Model 100. In brief, its answers



HARDWARE EVALUATION

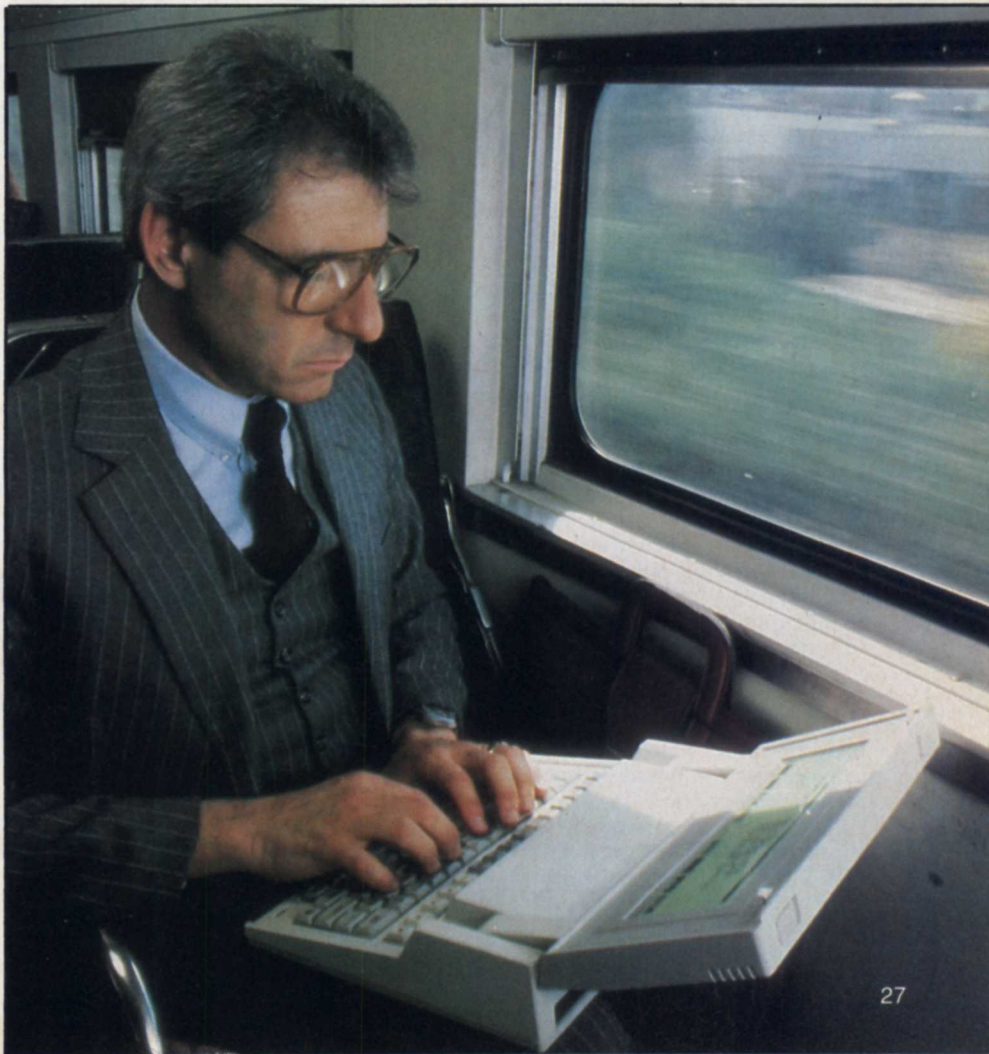
John J. Anderson

to the question posed above are as follows. It can:

- Provide bare-bones word processing with a tolerable screen size.

- Maintain a database.
- Dial the phone from a list of stored numbers.
- Keep time and maintain an automatic calendar.
- Keep track of appointments.
- Act as a terminal for communication with mainframes and other micros.
- Provide Basic so you can program your own applications.

This was a good set of starting criteria, and the market agreed. Other



manufacturers straightened up with a snap. The portable market had been born.

My Model 100 has 32K, which seemed like quite a lot for a portable—until the subject at hand arrived. Sure, I ran out of memory every time I rough-drafted an article such as this one, but you have to live with that kind of thing, right?

Okay; this is not a Model 100 review. I am using the Model 100 as a unit of measure. Its capabilities have become the standard by which to measure new competitors.

When I first reviewed the Radio Shack Model 100 in August of 1983, I heralded the success of the machine as a direct result of its increased screen size. As opposed to its predecessor, the Epson HX-20, the Model 100 gave you 40 columns by 8 rows—the kind of screen size you needed to actually get some work done.

At the time, I gleefully anticipated the advent of larger LCD screen sizes. I predicted that portables' screens would come to reside in the flip-up lids that protected their keyboards and that with each increase in screen size, the machines would become more desirable.

That was not a difficult prediction to make, and by the time Dave Ahl put together the notebook computer issue of *Creative Computing* in January 1984, fully four flip-up models had been announced (see sidebar).

Dream Machine

Also appearing in that January issue was a piece by Dave called "The Ultimate Notebook Computer." Described in some detail and depicted as an artist's conception was a dream machine of major, albeit diminutive, proportion. It was an imaginative aggregate of all one might want from a notebook portable. Large display, large memory, built-in software of great capability, modems, adjustable screen angle; the list went on.

When the Hewlett-Packard HP 110 showed up at the lab a few days ago, I was agog. I had heard that HP was going to do a notebook portable, but was totally unprepared for what I saw.

My thoughts ran again and again to the "ultimate portable." We have seen a heck of a lot of notebook machines around here, and some of them have been rather impressive. We really use notebook machines here (the first draft of this piece was composed on one), and we know how they stack up.

So I'll quit the long winded buildup and move straight to the central theme: the HP 110 is quite simply the finest notebook computer available on the market today.

It doesn't attempt to impress with

\$5000 plasma displays or touch screens or mice or icons or even the sexiest designer styling you will ever see. It offers instead sheer power—more power than nine out of ten current desk-top systems by my thumbnail accounting—and the sexiest ROM software you have ever imagined.

The 110 offers unbelievable set of specifications in an off-white box 13" wide by 10" deep by 2-7/8" high, weighing 9 lbs. 2 oz. I dare say you may have trouble suspending disbelief at a description of the features of the HP 110. It sports a CMOS (complementary metal oxide semiconductor) 8086 microprocessor. This a true 16-bit micro-

processor with a 16-bit data bus. It runs at a clock rate of 5.33 megaHertz. That is fast.

The HP 110 features 272K of non-volatile CMOS RAM. That means that you can turn the machine off and a trickle charge keeps your information intact within RAM memory. Another 8K of RAM is dedicated to the screen display. This is a highly legible LCD screen at 80 characters by 16 rows. With twice the horizontal and vertical resolution of the Model 100, the HP 110 display makes a Model 100 screen seem positively claustrophobic. (In fairness, although the Model 100 makes an excellent yardstick, it is probably unfair to compare it point for point with the HP 110. The 110 beats it cold and also costs four times as much.)

How they crammed all this stuff into such a pretty little case is beyond me. I wanted to take a screwdriver to it, but had second thoughts. Not only is it rude to dismantle a prototype on the first date, but a mishap could end in tragedy. So we'll follow up with a look inside the HP 110 at a later date.

And legible LCD display? Talk to me about legible LCD displays. The font is not only clear but extremely handsome with thick and thin strokes that emulate a printed typeface. The 110 can plot 480 by 128 pixels in the bit-mapped mode, and screen contrast is controllable directly from the keyboard.

It features 384K of CMOS ROM. These are not typos, folks. Another 8K of ROM is devoted to configuration and serial number.

What is nearly 400K of ROM used for? Well, an utterly complete version of *Lotus 1-2-3* resides inside the machine, for one thing. That is the number one selling integrated spreadsheet, statistical graphics, and information management package. Also in ROM are *MemoMaker*, a full-function word processor; *Personal Applications Manager* (a menu-based MS-DOS shell); and a terminal communications package.

In addition to this built-in software, there is the MS-DOS 2.11 operating system. This makes reams of existing software, including programs from the HP 150 touchscreen desktop computer (reviewed in the April issue of *Creative Computing*), a distinctly compatible possibility. It also makes the HP 110 compatible with other MS-DOS machines, like uh, the IBM PC, for example.

And because all this software resides in ROM there is more RAM room left to these applications on the HP 110 than most any other machines on which you might imagine running them.

The keyboard is a half-stroke, Selectric-style 75-key matrix, with eight

HARDWARE PROFILE



Name: Hewlett Packard HP 110

Type: Portable microcomputer

CPU: CMOS 8086, 16-bit

RAM: 272 K

ROM: 384K

Keyboard: 75-Key Selectric-style half-stroke

Operating System: MS-DOS 2.11 in ROM

Display Resolution: 80 characters by 16 lines, 128 x 140 pixels

Ports: HP-11L, HP-11B, serial RS-232, printer, modular phone

Dimensions: 13" x 10" x 3", 9 lbs.

Documentation: Preliminary at time of evaluation.

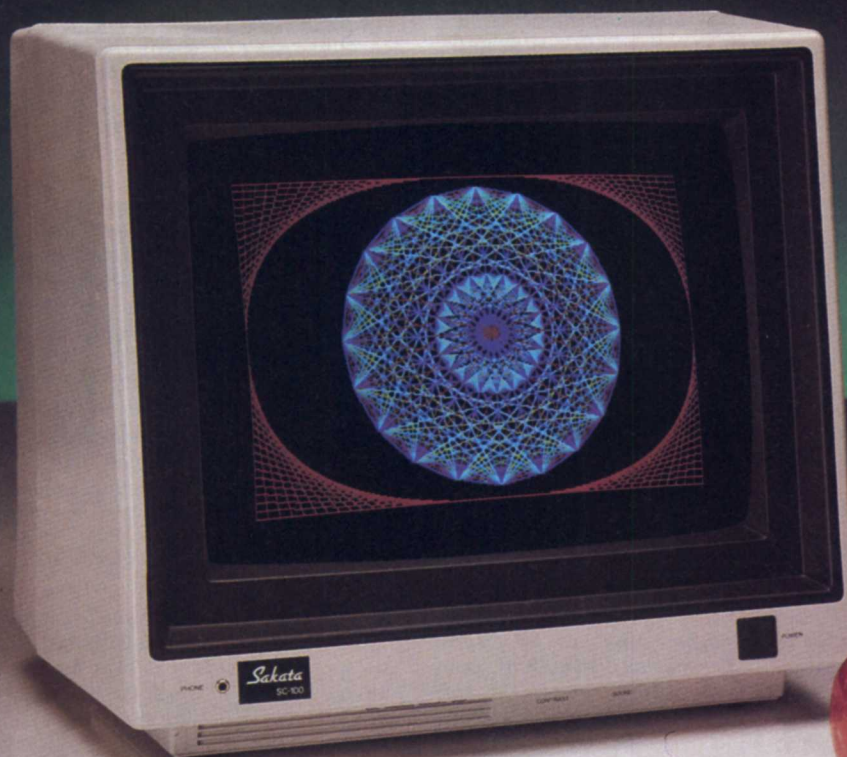
Summary: The most powerful self-contained portable computer system ever offered.

Price: \$2995

Manufacturer:

Hewlett Packard
19420 Homestead Rd.
Cupertino, CA 95014
(408) 725-8111

THE SAKATA CONNECTION



Monitor Value and compatibility for your Apple II, Ile.

The SAKATA SC-100 Composite Color Monitor is completely compatible with your Apple Computers. Combining low distortion, exceptional linearity with true colors for vivid graphics, SAKATA's SC-100 gives better performance and extra value.

See the complete line of SAKATA CRT monitors wherever personal computers are sold...RGB High Resolution (SC-200) RGB Super High Resolution (SC-300) Monochrome Green (SG-1000), Monochrome Amber (SA-1000)...and SC-100 for Apple II and Ile.

Or, write for illustrated and technical literature and prices.

"We Promise Performance."

Open up a new world for your Apple Ile. If you require 80 columns or super high graphics, use the SAKATA SC-200 RGB High Resolution monitor with the SAKATA XB-7 Board, 80 column/RGB extender board for your Apple Ile.



SAKATA U.S.A. CORPORATION
651 Bonnie Lane, Elk Grove Village, Illinois 60007
(312) 593-3211 800-323-6647 (outside Illinois)

Sakata

"Serving industry worldwide since 1896"

CIRCLE 166 ON READER SERVICE CARD

special-function keys. We shall take a closer look at the keyboard up ahead.

Power is supplied by three semi-permanently installed, lead/acid D-cell batteries. Lead/acids charge faster and hold that charge longer than nicads. The light, compact power adapter supplied with the unit provides AC power and/or recharge juice for the D-cells. Battery life is estimated at 16 hours of continuous use on a full charge. Of course, if you use the batteries on a less stringent duty cycle, they can last much longer before requiring a recharge. CMOS memory can be retained for a solid year while the unit is off. The cells themselves are rated at five years of service life.

From the main applications menu, you get an automatic display of battery condition. If power drops to less than 1.5 hours, a low battery indication is displayed every eight minutes. If the power dips below five percent, the machine shuts itself off and can be powered back on only when the AC adapter is attached and functioning.

As you might have extrapolated in your growing awe by now, a modem is indeed built-in to the unit as well. It is a 300 baud direct-connect modem with auto-answer and auto-dial, and it is capable of producing both pulse and tone dial signals. It functions smoothly and simply with the built-in telecommunica-

tions software.

The system also sports a built-in clock/calendar, of course, with calendar capability through December 31, 2079. After that you'll require a ROM update. Clock resolution is to a tenth of a second, with an accuracy of two minutes per month under normal conditions. Multiple alarm and appointment keeping functions are provided. Whenever an application ruler is invoked, the time appears near the center of it—a very nice touch.

In addition to all these features, it must be mentioned that the HP 110 is absolutely the sturdiest portable we have seen to date. While we did not drop test it from a height of three feet onto a concrete floor, we were told that the 110 can withstand a 100-g force on all six sides. It will withstand operating temperature extremes of 32 to 115 degrees Fahrenheit (0 to 45 degrees Celsius). If it gets hotter or colder, best to shut it off and shove off.

For scientists and technicians on-site, the HP 110 is probably the first practical means of bringing a serious and powerful computer *to the problem* as opposed to the other way around. It is built to withstand tough field conditions that no other portable would survive over term.

Hewlett Packard has always had very exacting quality standards for its hard-

ware, and the Model 110 is in no way an exception. But the story just begins with the Model 110 itself.

Perfect Portable Peripherals

A special machine deserves a special mass storage device, and the HP 110 will have one. The HP 9114 disk drive unit is a Sony-format 3½" hard-shell floppy, capable of storing about 630K per double-sided disk. And the unique fact setting the 9114 apart is that it sports an internal battery pack as well, making it the first self-powered and self-contained professional disk drive unit.

One battery charge will see you through six to eight hours of use, depending on the duty cycle. The dimensions of the unit are 11½" x 8" x 3", at a weight of a mere 5 lbs. 9 oz. The transfer rate is 6K per second maximum with an average access time of 497 milliseconds.

The 9114 drive is still very much in prototype, and so we did not get a chance to do more than read about it, as you are doing. There is no doubt, however, that HP will make good on the promise to deliver—probably around the time you read this.

In the meantime, you can connect existing HP floppy drives to the HP 110 using the HP-IL bus, standardized for HP hardware. This makes daisy-chaining of interface loop peripherals trivial.

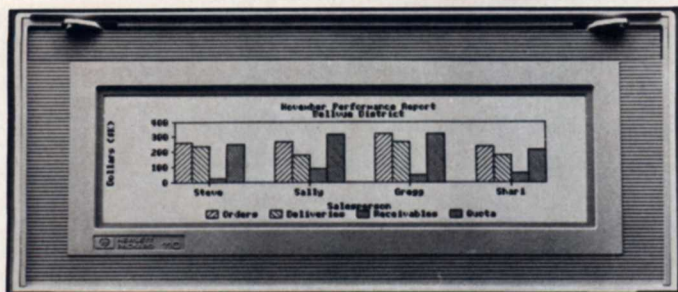
HP 110 vs. Sharp PC-5000

The most obvious comparison to be made with currently available portables would be to match up the features of the HP 110 with those of the PC-5000 from Sharp.

Both machines offer an 80-column flip-up LCD display, MS-DOS compatibility, built-in modem, ROM software, and a carrying weight in the neighborhood of 10 lbs.

The Sharp unit cannot match the basic specs of the HP 110, but then it must be noted that it is \$500 cheaper with modem (\$2350) than the HP machine. Without the modem feature, the PC-





Lotus 1-2-3 software comes built into the HP 110.



The keyboard. Note linear cursor key placement.

Additionally, the HP 110 contains a standard RS-232C interface for setting up serial devices, and provisions to interface with HP-IB peripherals as well.

Because RAM memory is partitioned into theoretical silicon drives A and B, external drives are referenced beginning with drive C.

As soon as we receive an HP 9114 at the lab for testing, we will provide a follow-up evaluation. At press time we had no pricing information on the unit.

The ThinkJet

Another unique peripheral designed especially to reside along an HP 110 HP-IL chain is the HP 2225 "ThinkJet" printer. Even if there were no HP 110, the ThinkJet would deserve a stand-alone review. It is hardly bigger than the average dictionary and is priced under

\$500. At the same time, it is a full-function 80-column printer, utilizing state-of-the-art ink jet technology to get the print onto the page.

The ThinkJet weighs less than 7 lbs. and has a footprint of a mere 93.2 sq. inches. It measures 11.5" x 8.1" x 3.5". It accepts pin feed, fanfold, or friction feed single sheets.

The unit is capable of print speeds to 150 cps, with a noise rating of under 50 decibels, which is only attainable at that speed through non-impact inkjet technology.

Four pitches are available, each in regular or boldface mode. International character sets are supported, as are underlining, super-, and subscripts. Text appears in an 11 x 12 dot character matrix. Graphics resolution is to 192 x 96 dots per inch.

5000 lists for \$1995.

The HP 110 offers 272K of CMOS RAM, while the PC-5000 offers "only" 128K, expandable to 256K. The PC-5000 has a "mere" 192K of ROM, as compared with the HP's whopping 384K. The Sharp uses a "hot" 8088 microprocessor, with an 8-bit data bus, while the HP uses a CMOS 8086, for true 16-bit operation.

The most significant difference between the two machines is probably in the area of screen size: the Sharp sports an 80-column by 8 line display, while the HP 110 offers 80 columns by 16 lines. On this account the HP is without question the winner. The difference may not sound like much, but it makes a very big difference indeed during use.

We did not confirm the theory, but in a torture-test competition, we feel confident that the HP would outlast the Sharp by a wide margin. The Sharp machine does not seem to have been designed with punishment in mind. The HP, on the other hand, comes from a long line of machines built to military specifications.

But there are more than a couple of areas where the Sharp PC-5000 manages to come out on top of the HP. For another \$400, you can get your PC-5000 with a built-in 80-column dot-matrix im-

compact printer, and system weight then reaches only 12 lbs! The modem unit is unique and includes a module that can be used as a voice handset.

HP could learn a bit about keyboards from the handsome, sculpted keyboard offered on the Sharp machine. It clearly has a superior feel to that of the Model 110. Unfortunately, neither machine makes use of directional function keys. So far the NEC 8201 seems the only portable to get high marks on that score.

Probably the most significant advantage of the Sharp machine is its RAM cartridge capacity. Open a neat little door on the front on the unit, and pop in or out a 128K bubble memory cartridge. These cartridges can hold applications programs as well as operating systems and user data, just like a floppy disk. On the road, this arrangement is more compact and convenient than floppies. Of course if floppy drives are what you want, you can have those too.

The PC-5000 also comes with Basic in ROM and an audio cassette port.

The Sharp PC-5000 is just becoming available in this country, and if it can be distributed successfully, might pose the greatest competition to Hewlett Packard in the category of high-end portables. For a full review of the Sharp machine, see the January 1984 issue.

Text and graphics print quality is extremely good, as reproduced here (Figures 1 and 2). Print buffer size is 1K, and carriage returns are selectably bi-directional and logic-seeking.

Three versions of the printer will be made available. The HP-IB version is designed to mate with HP desktop and handheld machines, while a Centronics parallel version will service markets outside HP (which could turn out to be sizable). We received the HP-IL version, designed especially to mate with the HP 110. It has a very special bonus—it too sports a rechargeable internal battery pack. The HP-IL ThinkJet therefore qualifies as a truly portable printer. Teamed with the HP 110 and HP 9114 portable drive, the HP 2225 ThinkJet rounds out the first truly portable computer system ever offered.

Remember, no computer is truly portable if you can't take it beyond the reach of the longest extension cord you own. If you are researching polar bears in Hudson's Bay or just spend a lot of time traveling, this could be important.

Turning On

Remove the HP 110 from its handsome protective carrying case and snap open the lid just as you would a fine attaché. Adjust the physical angle of the screen to the optimal viewing angle (it will counterbalance to stay at any position you set). Press any key to activate the display. Adjust LCD contrast directly from the keyboard.

You will be presented with the Personal Applications Manager menu. This, and all the ROM software on the Model 110, is menu-driven, using either the eight function keys, or directional highlighting, to make a selection from the menu. At any and all points within P.A.M., Memomaker, Lotus, and the terminal communications package, you are presented with or can call menus to delineate all your options.

Even more significantly, I have never seen a portable computer with anything remotely approaching the level of help that the Model 110 offers. Quite a lot of code can be packed into 384K of ROM—more ROM, incidentally, than any microcomputer has used before.

retail disk. I am not a real Basic freak, but I missed the presence of Basic on the HP 110. I would have liked to have made a project of transporting it over from its consanguineous pal, the HP 150, but time restrictions precluded such ambitious plans.

But, if you're a Pascalian, Forthright, Logotype, or Lispian, you will be glad to hear that no ROM has been wasted on Basic, and you may airlift in your language of choice.

down from its HP 150 debut version and works very nicely on the 110 display.

As with the Model 100, you can gain maximum screen space by clicking off the menu ruler once you have an idea what the function keys can do for you.

Not having worked with any very large files on MemoMaker, I cannot speak for its utility in handling the very big jobs. Judging by its format and its name, I would not recommend writing a novel on it, though I am quite sure you could. However, I think that HP is betting that most Model 110 MemoMaker files will be 25 pages or less, and I would agree with them on this judgement. And MemoMaker works very well on this size document.

The terminal package is excellent, and I spent a couple of enjoyable late evening sessions with the Model 110 on Compuserve. As mentioned above, you can save sets of terminal configurations, including phone number, log-on string, and terminal parameters. Then all you have to type is CSERVE, for example, and the Model 110 will autodial your local access number, put you on-line, send your log-on string, and set you down gently into full duplex. Uploading and downloading of files is straightforwardly menu-driven. And if you get into trouble, the ever-present help screens are at hand.

One of the most convenient features of the HP 110, and one I have always missed on my Model 100, is the ability to set multiple alarms from the clock calendar. Simply define a special file from MemoMaker, indicating the times dates, and messages you would like to include with the alarms. Then, whether



July 1984 • Creative Computing

This is more than a simple trivial pursuit. This is . . .

Pursuit of Knowledge



A Learn-By-Playing Game for Apple II, Apple II+, and Apple IIE computers*.

Pursuit of Knowledge has over 7000 carefully selected and researched questions.

It can be played by one player, or up to 6 players, or teams.

Numerous playing options are available as parameters vary from game to game. Some of these parameters are:

TIMER may be set anywhere from 15 sec. to 3 minutes or not used at all.

LENGTH OF GAME - you predetermine how many questions will be asked or how many points will be required to win.

ASSESSING PENALTIES - you choose point deductions for incorrect answers.

SPECIAL FEATURES:

Pursuit of Knowledge has numerous special features built into the program! The game will be enjoyable for many years. A few of these features are:

STATISTICS - each player or team has their own screen of how they are progressing statistically in the game.

RANDOM SELECTION - the computer randomly chooses which diskette side, as well as the questions that will be asked.

NUMBER OF PLAYERS OR TEAMS can be changed during the game.

CHANGE OF SCORE FEATURE - the computer allows for handicapping or to continue games (which can last for weeks or months).

AND MUCH MORE!

UNSURPASSED QUALITY. The game comes in a luxurious padded vinyl binder to keep your diskettes safe and secure.

Ask your local retailer for "Pursuit of Knowledge". If they do not carry it, telephone or write us.

Gemini Info Systems Ltd.
Box 1629
Great Falls, Montana
59403
(403) 251-3393

or in Canada**
Gemini Info Systems Ltd.
Box 817 Station T
Calgary, Alberta
T2H 2H3

* Soon to be available for the Macintosh, PC Jr., and other computers.

** Special Canadian edition includes over 1000 Canadiana questions.

Also soon available, "JUNIOR" Pursuit of Knowledge and "GENIUS" Pursuit of Knowledge.

GemWare™
MICROCOMPUTER SOFTWARE

Apple & Macintosh are registered trademarks of Apple Computer, Inc.

PC Jr. is a registered trademark of IBM, Inc.

CIRCLE 127 ON READER SERVICE CARD

the machine is on or off, a pleasant electronic alarm will sound at the preset date and time.

If the machine is off when the alarm sounds, the message will automatically be displayed. If you are working with the computer when the alarm sounds, you are offered the option of moving to the alarm message screen. You can turn off the alarm by hitting a key or it will shut down automatically after about 12 seconds. Up to 16 alarm presets can be set simultaneously.

You can also use alarms to invoke special programs at special times. I would assume that the electronic speaker can be made to beep, hum, or chirp under user control as well.

Hewlett Packard has also announced an initial release of optional software available on 3½" disks. These include:

- Microsoft *MultiPlan*, a multi-purpose electronic spreadsheet.
- Microsoft *Chart*, a presentation graphics package.
- *MicroPlan*, a financial package from Chang Labs.
- Microsoft *Basic*.

I have never seen a portable computer with anything remotely approaching the level of help that the Model 110 offers.

- Microsoft *Compiled Basic*.
- Microsoft *Pascal*.
- Microsoft *Fortran*.
- Microsoft *Cobol*.
- MicroPro *WordStar*, the classic word processing program.
- MicroPro *MailMerge*, multipurpose file merging program
- MicroPro *SpellStar*, *WordStar* spelling checker.
- Microsoft *Word*, word processing program.
- Ashton-Tate *dBase II*, a relational database management tool.
- Ashton-Tate *Friday*, an information management tool.
- Link Systems *Datafax*, an electronic notebook program.
- Link Systems *Datalink PC*, a telecommunications software package.
- Dow Jones Market Analyzer, a financial portfolio management package.
- Dow Jones Investment Evaluator, an investment analysis package.

Among the entertainment packages that will be available on disk for the HP 110 is the *Zork* series of adventures from

Infocom.

I would have liked to comment on the documentation that will accompany the release system package, but all material we received was extremely preliminary. I cannot comment at all on the final documentation based on what was supplied with the prototype unit.

Nitpicking is My Life, Man

Here is an utterly phenomenal machine with capabilities that leave many of the desktop micros currently available looking rather pale. And yet, there are a few things about the HP 110 that are slightly disappointing. Oh, the joys of being a critic. One thing is for sure, if I am going to pick nits, I prefer to pick state-of-the-art nits. And certainly the 110 fits that category.

Some accompanying PR copy refers to the HP 110 as weighing 8½ lbs. The prototype we tested weighed 9 lbs. 2 oz. Still, that's light, right?

After it has been sitting on your lap for a while, 9 lbs. 2 oz. is enough to cut off most of the circulation to your legs. After it has been sitting in your shoulder bag for a while, you begin to feel a little numb. After you have carried it for a while, the carrying arm begins to feel noticeably longer than the other.

It would be insane to call the HP 110 "too heavy," and I am not doing that here. It is *light as a feather* for a machine with 272K of RAM. And I certainly would not trade it for 128K at 4 lbs., or even 64K at 2 lbs.

Still, the HP 110 is not "light." Find a table when using it for protracted sessions. Switch arms and shoulders when porting it about. And jettison the antiquated pads, appointment books, and portfolios you may consider carrying along with the unit. The 110 is all that you will ever need and all that you will ever want to carry.

The keyboard feel of the unit is not optimal. You may have noticed that I called it a "half-stroke" keyboard above, as opposed to a full-stroke. I said that because the "travel," or distance that a key moves from the unpressed to the fully depressed position, is rather scant. The result is a rather flat feeling that detracts slightly from speed.

The keyboard choice obviously optimized the use of space inside the unit. The more you want a key to travel, the deeper the keyboard "well" you need. Don't misunderstand: the HP keyboard is far superior—in no way comparable—to membrane and Chiclet keyboards. Touch typing is quite possible on it, though an experienced typist might be slightly disappointed with the feel.

The Model 100 keyboard has just a little bit more travel, (a couple of milli-

meters or so), yet this translates into a much better feel. Perhaps HP might think about a fuller-travel keyboard for its own machine.

I was also disappointed at the linear placement of the cursor keys. It makes them tough to use.

There is no cartridge slot to be found anywhere on the machine. With 384K ROM and 272K RAM, this is not a major consideration. Or is it? If a cartridge slot were available, ROM software changes could be made without requiring a trip to the service department. If a RAM slot were available, there would never be a point at which you were truly out of CMOS RAM. (See the August 1983 and January 1984 issues of *Creative Computing* for more information on the RAM cartridge.)

There is no apparent video bus. It is possible that HP might make Model 110 video output a reality anyway, but I saw no hardware hint or manual reference to

It would be insane to call the HP 110 "too heavy." It is light as a feather for a machine with 272K of RAM.

any type of bus other than the ones described above. That might preclude video capability with the HP 110.

The unit we received would not self-test. Self-testing is an important capability for a machine as powerful and complex as the HP 110, and such a feature is referenced by the preliminary documentation we received. Yet we could not get our evaluation unit to self-test. As we received one of the very first units, we assume this is a ROM problem of our machine alone, and will not be a problem on machines that come off the line.

The ThinkJet cartridge requires frequent replacement. Each Thinkjet ink cartridge contains about 3 ccs of usable ink, which is good for about 500 pages of text, before requiring replacement. If you use the printer frequently, it will be important to keep extra cartridges on hand.

The Bottom Line

We don't think these criticisms detract in the slightest from the technological marvel that is the HP 110. If you have \$2995 to spend on a portable, there is no other machine to consider. The highest compliment: I was utterly crushed to send it back.

CIRCLE 401 ON READER SERVICE CARD

July 1984 © Creative Computing

SUMMER GAMES.[™]

WHY WATCH THE OLYMPICS WHEN YOU CAN BE IN THEM?



You're an Olympic athlete competing in eight key events at the Summer Games. How well can you score in track, swimming, diving, shooting, gymnastics and more? So realistic, there's even an opening ceremony and awards presentation after each event.

Unlike other "Olympics-Like" games, Summer Games has incredible realism, superb state-of-the-art graphics and sound effects (including national anthems from 18 countries), and it is a true action-strategy game. In each event you must plan and execute your game strategy in order to maximize your score. It is not just a matter of how fast you can move the joystick.

So change into your running shoes, grab your joystick and **GO FOR THE GOLD!**

One or more players; joystick controlled.



EPYX[™]
COMPUTER SOFTWARE



Strategy Games for the Action-Game Player

CIRCLE 125 ON READER SERVICE CARD

"Dare to

TI makes the best software perform even better.

When choosing a computer, there are two important things to look for. Who runs the best software—and who runs the software *best*! That's why we're staging a dramatic country-wide side-by-side comparison against IBM™ called "Dare to Compare."

Come to a participating dealer and take the "Dare to Compare" challenge. You'll see first-hand how...

TI makes software faster to use.

Take a closer look. See how we give you more information on-screen than the IBM PC? That way you'll spend less time looking for data, and more time using it. We also give you 12 function keys, while they give you 10. Unlike IBM, we give you a separate numeric keypad and cursor controls. And that saves you both keystrokes and time. We also isolated the edit/delete keys to reduce the chance of making mistakes.

TI makes software easier to use.

TI gives you up to 8 colors on-screen simultaneously, which makes separating the data a lot easier. IBM displays only 4. Our graphics are also sharper. And easier on the eyes.



IBM Personal Computer

Compare"

And TI makes it easier to get your data on-screen. Our keyboard is simpler—it's more like the familiar IBM Selectric™ typewriter than the IBM PC keyboard is.

TI lets you see for yourself.

Right now, you can "Dare to Compare" for yourself at participating TI dealers all over the country. Stop in, present your business card, put both machines through their paces using the same software titles, and see the difference for yourself. We'll give you a TI solar powered calculator, free, just for taking our challenge*.

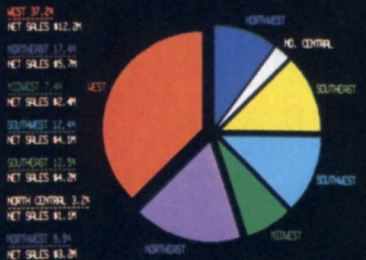
For the name of a participating dealer near you, please call TI toll-free at 1-800-527-3500, or write: Texas Instruments Incorporated, P.O. Box 402430, Dept.DCA232CC, Dallas, Texas 75240.



**TEXAS
INSTRUMENTS**
Creating useful products and services for you.

TEXAS
INSTRUMENTS

FIRST QUARTER SALES BY SALES REGION



* This offer available only to persons age 21 or over, while supplies last.
This offer expires July 31, 1984.
BPS Business Graphics™ shown.
BPS is a trademark of Business & Professional Software Incorporated.
IBM and Selectric are trademarks of International Business Machines, Inc.
Copyright © 1984 Texas Instruments

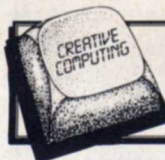
Texas Instruments Professional Computer

DTC 2763-69

***NCR enters the desktop market
with a novel 8/16-bit German-designed computer***

NCR Decision Mate V





HARDWARE EVALUATION

David H. Ahl

The NCR Decision Mate V is an interesting entry in the world of business-oriented personal computers. In its normal configuration, it is furnished with an 8-bit Z80A microprocessor. However, an optional plug-in module is available that converts the machine into a dual 8/16-bit processor with the capability of running both CP/M-86 and MS-DOS. If this option is ordered with

NCR Decision Mate V has display and disk drives in single unit; keyboard is on a four-foot coiled cord.

New Strategy for the Bunch

It used to be Snow White and the seven dwarfs. Then GE and RCA left the computer business. Today, the five remaining mainframe majors are known as the Bunch (for Burroughs, Univac, NCR, Control Data, and Honeywell).

Today, most of the Bunch are scrambling to get into the desktop computer business. But, in the view of Jack Hart, an analyst at International Data, the move "looks like too little, too late."

With 1983 revenues of \$3.8 billion, NCR is the smallest of the Bunch companies. Nevertheless, \$3.8 billion makes NCR considerably larger than most of the players in the microcomputer industry. Moreover, NCR's strength in small systems—linked primarily to supermarket checkout terminals and automatic bank teller machines—has made it the most profitable of the Bunch companies.

NCR has invested heavily in personal computers and microelectronics and even the semiconductor business. Most of these ventures are not yet profitable, but Charles Exley, Jr., president of NCR predicts that 1984 will be the "year of the turnaround."

the basic machine, it is installed internally. We think this is the configuration that will have the greatest appeal to users, so that is what we tested.

The basic machine includes 64K (expandable to 512K); a 12" high-resolution monitor (monochrome or color); dual 5 1/4" double sided, double density disk drives; and a detachable keyboard. Available as options are a Winchester disk drive, parallel and serial interfaces, and additional memory, as well as a wide range of software.

In a departure from the traditional separate keyboard, display, and system unit, the German-engineered Decision Mate V combines the system unit and display into a single, compact package (14.9" x 18.1" x 14.6"). The CRT and

disk drives overhang the base of the unit so the total desk space occupied by the keyboard and display/disk unit is about the same as a TRS-80 Model 4 or IBM PCjr.

The unit we had for evaluation had the 8/16-bit processor option, 128K, dual floppy disks, color monitor, and parallel printer port.

Low-Profile Keyboard

Upon seeing the Decision Mate V, most people comment about the keyboard. Instead of the familiar sculpted keys found on most full-stroke keyboards, the Decision Mate V has square keys with raised round concave tops. Although the travel of each key is the same as on a standard keyboard, subjectively

HARDWARE PROFILE

Name: Decision Mate V
Type: Desktop business computer
CPU: 8-bit Z80A, optional 16-bit 8088
RAM: 64K expandable to 512K
Keyboard: Detached, 100 keys
Text resolution: 80 x 25
Graphics resolution: 640 x 400 pixels, 8 colors
Disk drives: Two 5 1/4" 320K floppy drives or 10Mb Winchester and one floppy drive
Ports: Optional parallel and RS-232 serial
Operating Systems: CP/M, CP/M-86, MS-DOS
Documentation: Small User's Guide; customized software vendor-produced manuals with applications software packages

Price: \$2650 and up

Summary: Capable 8/16-bit system able to run wide range of software; excellent graphics capability especially with supporting DR Graph package.

Manufacturer:

NCR Corporation
Dayton, OH 45479
(513) 445-2077



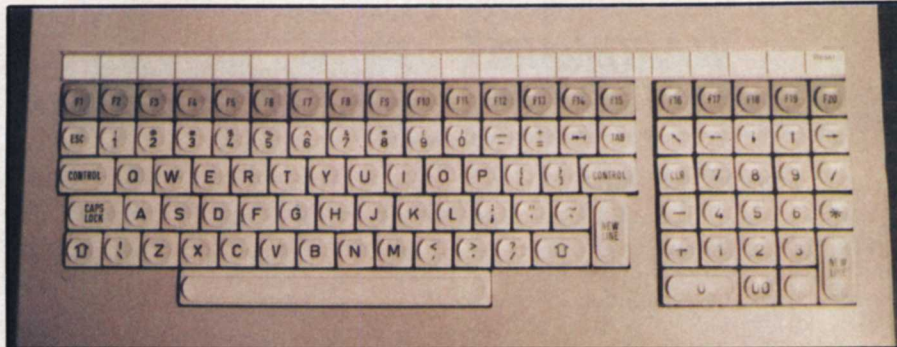
The system has a compact footprint on a desk.

it seems quite different. After a few hours of use, we had no trouble touch typing on the keyboard, but we never shed the feeling that it was "different." NCR tells us that a standard, sculpted keyboard will be available for the machine. On the other hand, it is our feeling that if this is your only computer, you will not have any trouble adjusting to the current unit.

The keyboard is physically divided into two groups of keys although there are the usual four logical groups of keys: alphanumeric, numeric keypad, control keys, and function keys. The alphanumeric keys are arranged in a reasonably standard pattern; there is only one extraneous key that might confuse a touch typist—the backslash between the Z and SHIFT at the left end of the bottom row. The RETURN key is double size and labeled NEW LINE. A second CONTROL key is found over it at the right side in addition to one in the usual place at the left side of the keyboard.

The CAPS LOCK key is a toggle and latches in a down position when it is depressed. All keys repeat automatically when held down for about one-half second. All keystrokes produce audible feedback through a small speaker in the system unit, the volume of which can be controlled (from silent to annoying) with a volume control on the front.

A 17-key numeric keypad on the right provides keys for the ten numerals, double zero, decimal point, four arithmetic operations, and NEW LINE. Also in this cluster are CLR, HOME, and four cursor keys. Unfortunately, the cursor keys are



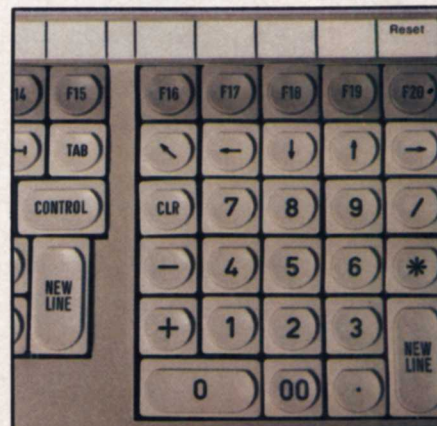
Keyboard has square keys with raised, round tops.

It takes time to get used to the rounded-top square keys.

laid out in a horizontal row rather than a more logical diamond or rectangular pattern.

Across the top of the keyboard are 20 programmable function keys. These are colored a dark gray to contrast with the other keys, which are white with black markings. Function Key 20 is normally set up as a RESET key, but the other 19 have different meanings depending upon the software package in use.

On the right side of the keyboard is a male DB9 connector for a switch-type (Atari) joystick or other controller. This is wired in parallel with the cursor control keys, and the fire button is equivalent



Right side of keyboard has an "extra" CONTROL key above the NEW LINE key. The numeric keypad has double zero for fast entry of financial data. Unfortunately, cursor control keys are arranged in a horizontal line.

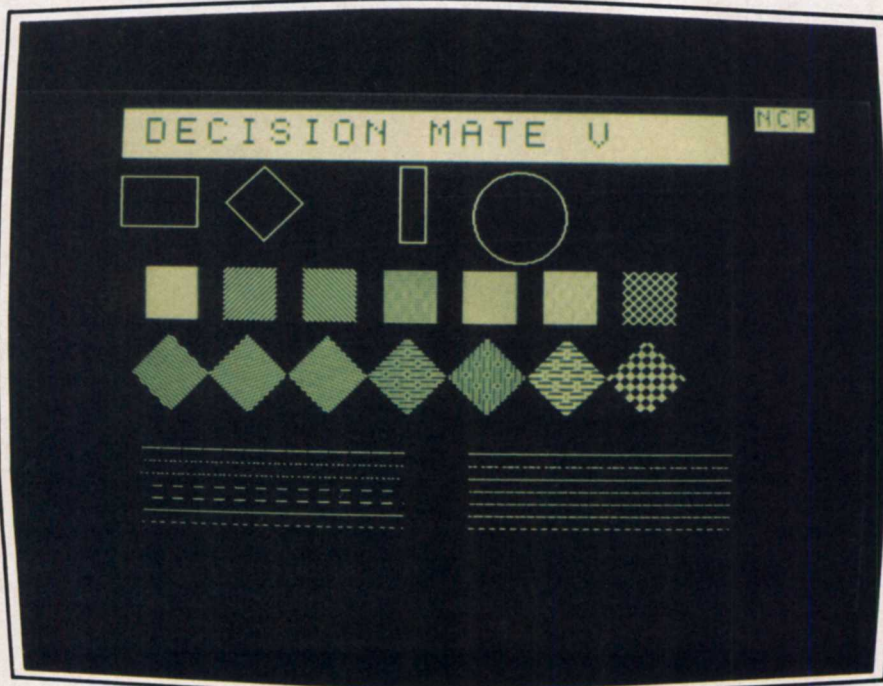
to NEW LINE. Although not documented by NCR, we found this a wonderful tool for moving around a spreadsheet program and editing word processing documents and Basic programs.

On the bottom of the keyboard is a DIP switch for selecting eight different character sets for English and seven other languages. The keyboard attaches to the system unit by means of a coiled cable with a reach of about four feet—more than enough for lap use. The keyboard has an eight-character buffer which permits rapid data entry without loss of characters.

High-Resolution Display

A high-resolution monochrome or color display is built in. On the color unit that we had, text is displayed in green on a dark blue background. As with most RGB displays, there is only one adjustment for brightness; no others are accessible to the user.

Text resolution is 25 lines of 80 characters. The characters have good definition on the color screen with full lowercase descenders and two-pixel interline spacing. For some reason, in reverse video (dark blue on green), much of the resolu-



Display has exceptional graphics resolution.



THANKS TO COMPU SERVE'S CB SIMULATOR, "DIGITAL FOX" ACCESSED "DATA HARI" AND PROCEEDED TO AN "ALTARED" STATE.

The CB Simulator, where CompuServe Subscribers can Access Friends and Influence People on 72 Different Channels.

Just pick your handle and get on line. From math to matrimony, there's always someone out there who speaks your language. Friends from all over the U.S. and Canada are at it 24 hours a day. Talking tech or just having fun. And if you've got a secret, just use the CB Scrambler.

That'll fool the "lurkers," those CB "see it alls" who get their kicks by watching. Or you can always use the private talk mode for guaranteed one-to-one conversation.

The CB Simulator is just one of CompuServe's many electronic communications options that include a National Bulletin Board, Professional Forums and Electronic Mail. Plus, there's a world of on-line information and entertainment all for the price of a local phone call plus connect time.

You can access CompuServe with almost any computer and modem, terminal or communicating word processor.

To receive your illustrated guide to the CompuServe Information Service and learn how to subscribe, call or contact:

CompuServe

Consumer Information Service, P.O. Box 20212
5000 Arlington Centre Blvd., Columbus, OH 43220

800-848-8199

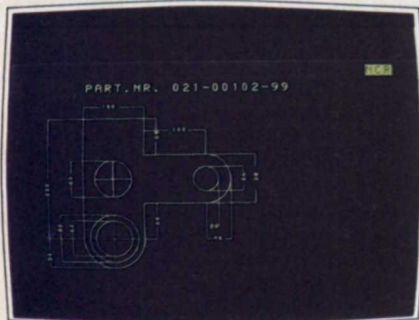
In Ohio call 614-457-0802

An H&R Block Company

CIRCLE 113 ON READER SERVICE CARD



Business graphics can be displayed in monochrome (shown here) or color.



High-resolution monochrome graphics are useful for engineering design.

tion is lost, and small characters are difficult to distinguish. On the other hand, reverse video is used only for notations at the bottom of the screen, so this is not especially bothersome.

Graphics resolution is 640 by 400 pixels (about 15% more than the IBM PC and its clones) so the detail on graphs, schematic diagrams, and engineering drawings is truly amazing. Moreover, this resolution is preserved in all eight colors (black, white, red, blue, yellow, magenta, green, and cyan). The only computer that we have evaluated in this price range with similar color graphics capabilities is the NEC 8801, although several of the other Japanese units have the same specifications.

The display is angled back at about five degrees; there is no provision for tilting or swiveling it.

The Heart of the System

In addition to the display, the system unit contains the mpu, memory, disk drives, and seven expansion slots. The basic unit has an 8-bit Z80A. The 8/16-bit option is contained in a 4" x 4" expansion module that plugs into expansion slot 1. This contains an 8088 mpu and, when installed, the Z80A is automatically dedicated to input and output functions. Graphics are produced by a third mpu, the NEC 7220 graphics chip (which explains why the graphics are the same as those on the NEC 8801). In addition to the graphics chip, separate graphics

memory is included in the unit, 32K for the monochrome display and 96K for the color display.

The speed of the Decision Mate V in the standard *Creative Computing* benchmark is comparable to that of other computers in its price range. Although not listed in the specifications, it would appear that the machine is operating at a 2MHz clock rate (see Table 1).

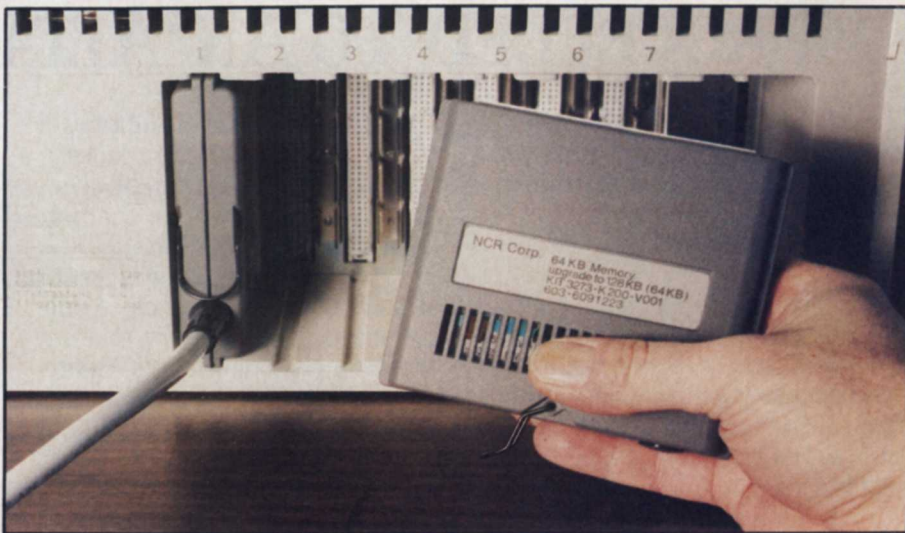
The basic unit includes 64K of user memory. Three plug-in expansion modules, which increase total memory to 128K, 256K, and 512K respectively, are available.

Three plug-in peripheral adapters are available: one for a Centronics-type parallel printer, one for an RS-232 compatible modem, and one for an RS-232 serial printer. In theory, any serial or parallel printer can be used with the Decision Mate V, but, NCR recommends using one of their own units (6411, 6442, or 6455). We used the computer with a Diablo 630, a popular daisywheel unit, and had no trouble although, frankly, we did not try to do any fancy printing or graphics.

Two slimline 5 1/4" disk drives are mounted vertically to the right of the display. They use the reliable quarter-rotation levers to secure the disks rather than fold-down doors. Each double sided, double density drive has a formatted storage capacity of 320K.

Seven 96-pin expansion slots are

Expansion modules can be plugged in without opening the system unit.



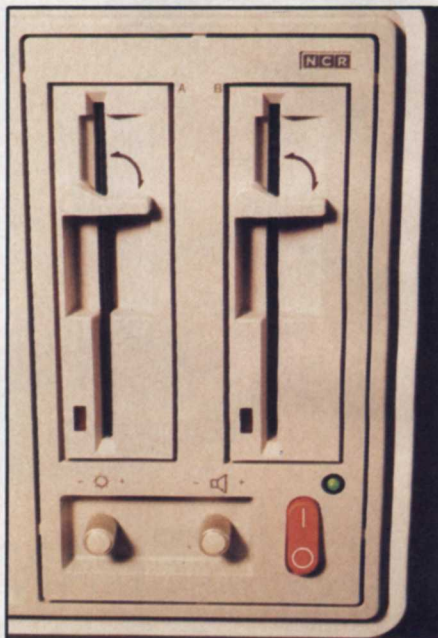
Optional add-ons plug into the back of the unit; no disassembly is required.

Computer	Time	Accuracy*
TI Professional	0:15	.005859375
NCR Decision Mate V	0:22	.005859375
IBM PC	0:24	.01159668

*Lower is better

Table 1. Benchmark test of selected computers.

found in a 4" x 8 1/2" recess in the back of the system unit. These slots accept processor, memory, and I/O port expansion modules. This is a handy design and eliminates the necessity of removing the cover or disassembling the computer to plug in an expansion module. The I/O



Disks are held in with reliable, quarter-rotation handles. Controls include screen brightness, sound level, and power off/on switch.

modules have either an attached cable or appropriate connector on the rear. The parallel printer module, for example, includes a six-foot attached cable.

The 10Mb Winchester drive, if installed, replaces the floppy disk drive on the left side. Like the floppy disk drives, it has a small red LED indicating operation of the drive.

The system unit has an outward-facing muffin fan at the rear which is all but inaudible. A welcome touch is the orange rocker power switch on the front of the unit and green power-on lamp; this replaces the inaccessible power switch found on the side or rear of many similar computers.

System Software

Three operating systems are implemented for the Decision Mate V: CP/M, CP/M-86, and MS-DOS. Depending upon the options installed, you

Three operating systems are available: CP/M, CP/M-86, and MS-DOS.

can use one or all of these. For our testing, we used CP/M and MS-DOS.

As a protective feature, the MS-DOS master disk supplied with the Decision Mate V will not run until it has been copied onto a backup disk. Although manufacturers generally recommend copying the master disk, you can usually run the disk without doing so. Not so, with this machine. However, page 2.3 of the manual takes you step by step through the format and backup procedure, so it is not an onerous process to create this required backup disk. Once this is done, you are ready to go.

A plain vanilla version of MS-DOS—no menus or fancy stuff—is included. Nor are any of the function keys implemented. Of course, if you want, you can use the CONFIG utility to assign frequently used functions such as DIR, DEL, or COPY to function keys.

CP/M does not have the same protective feature as MS-DOS although it, like the other software disks with the system, is furnished on a disk with a permanent write-protect tab.

In addition to the standard CP/M disk, a second disk containing 15 demonstration and application programs is furnished. We found it curious that the contents of this CP/M disk are described in a supplement to the MS-DOS User's Guide, and there is no hint that they are CP/M programs rather than

MS-DOS ones.

These programs include several mediocre games (but after all, you don't buy a computer like this to play games), an excellent real-time clock demo, a continuous graphics demo, a music program with 11 tunes, and an excellent graphics application program.

VEGAS (Very Easy Graphics Application System) is a program written in MBasic which allows you to create line, bar, and pie charts and output them to certain NCR and Epson dot matrix printers. See Figure 1 for a sample graph created on this system.

Both MS-DOS and CP/M functioned as expected. One minor annoyance is the use by the main CP/M screen of black characters on a light blue background; we found this was more difficult to read than the standard green on dark blue used with MS-DOS. Curiously, the CP/M applications programs do use the green/dark blue combination.

Applications Software

Obviously with the availability of MS-DOS, CP/M, and CP/M-86, a great deal of software should be available for the Decision Mate V. As of this writing, NCR has made arrangements with several manufacturers to market customized versions of their packages. These include Microsoft GW Basic; MicroPro *Wordstar*, *SpellStar*, and *MailMerge*; Sorcim *SuperCalc*²; and several others. In addition, NCR offers its own business graphics package, DR Graph.

As we have often remarked, *WordStar* is an excellent full-functioned word processing system that should meet the needs of the most demanding user. It is not especially easy to learn, but the spiral bound Training Guide that MicroPro now supplies should make the task easier. Furthermore, it includes the usual extensive printer drivers for every imaginable type of printer in the WSINSTALL module. *WordStar* includes two manuals, a 20-lesson Training Guide in a spiral binder and a fat Reference Manual in a three-ring binder. It also includes a three-panel command card and keyboard overlay which fits over the function keys.

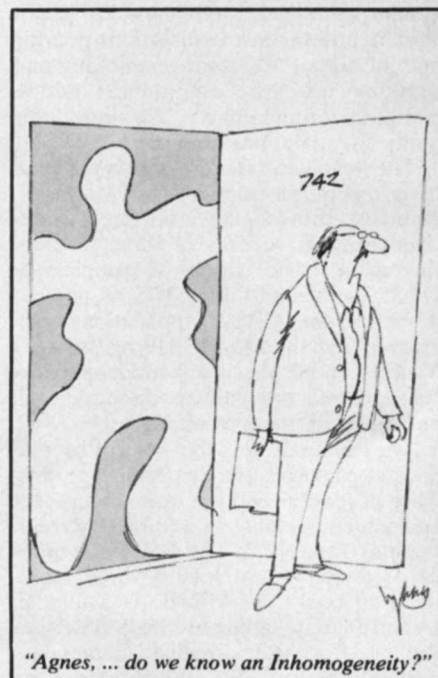
The function keys are not set automatically in *WordStar*. Rather, the WSKEY utility program must be run before you load *WordStar*. Unfortunately, *WordStar* does not take advantage of the color display as does the version furnished with the TI Professional and some other machines. Obviously, people have used *WordStar* for years without color, but having used the color version, we think it is a shame that more manufacturers do not customize the package to take advantage of color.

We were pleased to see that unlike *WordStar*, *SuperCalc*² takes advantage of the color display. Row and column labels are yellow while worksheet entries, prompt lines, and the cursor are green. This is a pleasing combination and very easy to read at a glance. *SuperCalc*² is an excellent, easy to learn, and easy to use spreadsheet package. It comes with a six-panel reference card, 20-page spiral bound booklet (10 Minutes to *SuperCalc*²), and a looseleaf three-ring User's Guide and Reference Manual.

GW Basic is the most advanced version of Microsoft Basic with all of the extensions and graphics statements implemented. Unfortunately, NCR did not follow the lead of Wang and re-do the Microsoft manual, so the user is faced with a three-part manual consisting of the MS-Basic User's Guide, MS-DOS Extension Guide, and GW-Basic Extension Guide. As if that weren't bad enough, none of the three has an index. Although the manual is terrible, GW-Basic is nifty—particularly the color graphics extensions. Using these graphics extensions, we tried some high-resolution plots and were amazed at the detail and clarity of the output, even with several colors mixed.

DR Graph

DR Graph is an interactive software package that lets you create a graph, preview, change, and enhance it before you print or plot it. This menu-driven package can create text-only charts as well as six types of graphs: line, bar, pie, step, stick, and scatter. As you design your graphs, you can generate titles and legends in different type sizes, fonts, and



"Agnes, ... do we know an Inhomogeneity?"

colors; add text to graphs; fill areas with various colors or patterns; and select line styles, widths, and colors.

DR Graph is furnished in either CP/M or CP/M-86 versions, and requires, for hard copy, either a plotter or dot matrix printer. The package supports a wide range of printers and plotters including units from Epson, Hewlett-Packard, Houston Instruments, DEC, Digital Engineering, ADDS, Datamedia, IDS, Okidata, Printronix, Strobe, and Televideo. The graph in Figure 2 was produced by DR Graph driving an Epson MX-80 printer with Graphtrax Plus.

We mentioned taking advantage of color in the previous section. Talk about color! If you have it, Dr Graph uses it, and uses it well. Of course, if you have a monochrome system, the high-resolution display is capable of displaying the detail on the graphs as well.

The manual is divided into four parts: a getting started tutorial, an advanced tutorial, a section on data interfacing, and a section on moving around in the menus. The data interfacing section describes how to load and use data from *VisiCalc*, *SuperCalc*, and other programs which store data in the DIF or SDI formats.

Documentation

This is the first computer we have evaluated in quite some time that did not come with a fat User's Guide or equivalent. Instead, the Decision Mate V has a 52-page introductory packet in the MS-DOS manual titled "User Information." The first two sections describe installation procedures and the elements of the system. The next tells how to get it started, and the last two sections provide helpful hints ("Discourage smoking and drinking near the computer") and a troubleshooting chart. We rate this guide adequate, but no more.

The MS-DOS User's Guide is the standard mishmash supplied by Microsoft. Actually, the MS-DOS Guide is better than most. It consists of three sections: the main basic guide, a supplement (which isn't about MS-DOS at all, but describes the CP/M applications programs), and the MS-DOS Programmer's Manual. In all, this is a formidable package and one designed to discourage all but the most courageous user.

The manuals for the MicroPro and Sorcim packages are written by the software producers and are quite competent and understandable as is the DR Graph manual from NCR. The GW Basic manual is awful, but at least a wide assortment of books on MBasic is available. Unfortunately, none of these describes the use of the graphics commands particularly well. We did not have the

CP/M manual so we cannot comment on it.

Service and Support

As a major manufacturer of mainframe computers, NCR has a large field service organization in 1200 offices throughout the world. Hence, they offer a range of service options including an on-site service contract, time and material service, and depot service. Also, computer stores and system houses selling the Decision Mate V may have established their own servicing arrangements.

To aid in the service procedure, a plug-in diagnostics module is available. This may not be an economic investment for sites with just one machine, but for companies with several units, it probably makes sense to diagnose problems before the clock starts running on expensive service rep time.

For real do-it-yourselfers or for multiple systems installations, NCR offers a set of service manuals. Be warned: these are not for the casual hacker.

Local Area Network

While this is not a review of a local area network, we should mention that NCR offers a network for up to 64 stations. NCR Omninet, a version of the

NCR offers Omninet, a cost-effective local area network.

CP Net developed by Digital Research, requires a central input/output file manager and a storage device known as Modus. Modus maximizes system throughput by using multiple I/O processors, cache memory, and state-of-the-art data management techniques. It allows many users to share the same file on the same peripheral, provided they all have the appropriate security clearance. Modus offers three levels of system security: user I.D., password, and user number.

Access to Omninet requires the addition of a plug-in communications module in each Decision Mate V. The module is supplied by Corvus, a leader in local area communications. Although 64 stations can be on the net, only 16 can be simultaneously operational. Omninet uses a data transmission rate of one megabit per second, one-tenth the speed of Ethernet, but it is easier to install and costs about half as much.

Pricing

The decision Mate V comes in three basic configurations, all of which have

64K of memory:

1. 8-bit mpu, monochrome display, \$2650.
2. 8/16-bit, monochrome, \$3090.
3. 8/16-bit, color display, \$3440.

Memory, other options, and software are priced as follows:

64K to 128K upgrade	\$200
64K to 256K upgrade	550
64K to 512K upgrade	1200
8 to 16-bit upgrade	500
10Mb Winchester drive	3000
Parallel interface	100
RS-232 serial interface	200
RS-232 modem interface	150
MS-DOS	50
CP/M-86	60
CP/M	150
WordStar	495
SuperCalc ²	295
DR Graph	400

Our 8/16-bit test machine with 128K, color display, parallel interface, MS-DOS, CP/M-86, *WordStar*, *SuperCalc*², and DR Graph—more or less an ideal configuration for business applications—would go for \$5040, certainly no bargain, but not out of line either.

A Decision for Decision Mate V?

Should you buy a Decision Mate V? The system is solidly engineered and constructed, and shows off its German heritage. For the price, we don't think the 8-bit configuration makes much sense (you can get a Z80A machine for one-half as much). However, the 8/16-bit configuration is another story. In one machine, you have the ability to run CP/M, CP/M-86, and MS-DOS software. While NCR doesn't offer that many packages directly, they are available from dealers and third party vendors.

The graphics are stunning and second to none. Moreover, the NCR DR Graph package produces business charts and graphs in an easy to use package.

The shortcomings? The keyboard for one. While it is possible to get used to the unusual round keys, there is no substitute for the good, solid feel of an Epson QX-10 or TI Professional keyboard. Since the system is not bundled with software, and interface modules are extra cost items, the price can mount up fast. A fully configured Decision Mate V with a good selection of software can cost upwards of \$5000, certainly no bargain.

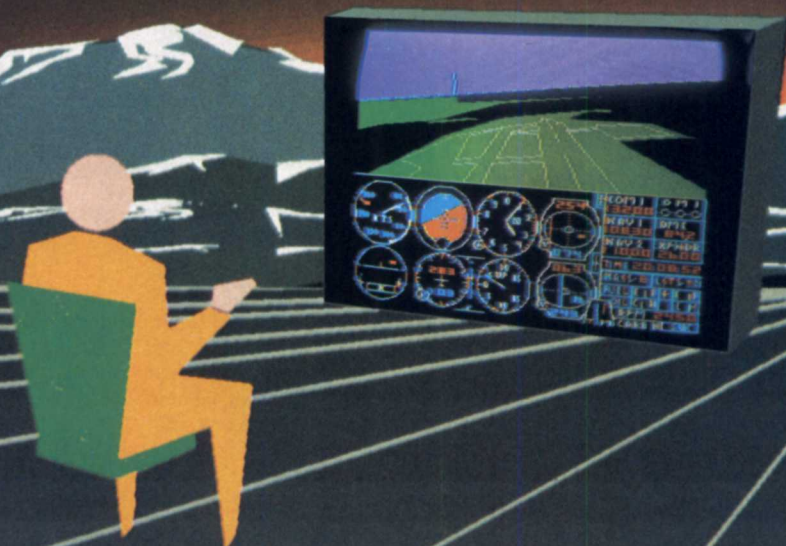
On the other hand, we were impressed with Omninet at Softcon and, for companies wanting this capability, it is a cost effective choice. But even as a stand-alone machine, the Decision Mate V offers a great deal of capability and potential. ■

CIRCLE 402 ON READER SERVICE CARD

July 1984 © Creative Computing

Flight Simulator II

For Apple,
Atari, & Commodore 64™



Put yourself in the pilot's seat of a Piper 181 Cherokee Archer for an awe-inspiring flight over realistic scenery from New York to Los Angeles. High speed color-filled 3D graphics will give you a beautiful panoramic view as you practice takeoffs, landings, and aerobatics. Complete documentation will get you airborne quickly even if you've never flown before. When you think you're ready, you can play the World War I Ace aerial battle game. Flight Simulator II features include ■ animated color 3D graphics ■ day, dusk, and night flying modes ■ over 80 airports in four scenery areas: New York, Chicago, Los Angeles, Seattle, with additional scenery areas available ■ user-variable weather, from clear blue skies to grey cloudy conditions ■ complete flight instrumentation ■ VOR, ILS, ADF, and DME radio equipped ■ navigation facilities and course plotting ■ World War I Ace aerial battle game ■ complete information manual and flight handbook.

See your dealer . . .

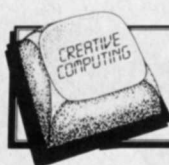
or for direct orders enclose \$49.95 plus \$2.00 for shipping and specify UPS or first class mail delivery. American Express, Diner's Club, MasterCard, and Visa accepted.

Order Line: 800 / 637-4983

CIRCLE 174 ON READER SERVICE CARD

subLOGIC
Corporation
713 Edgebrook Drive
Champaign IL 61820
(217) 359-8482 Telex: 206995

Apple II Mouse



HARDWARE EVALUATION

Steve Arrants

Apple owners who have taken a test drive with the Lisa or Macintosh are impressed by these new machines. They are sleek, powerful, and fun. But let's face it, most of us are not going to rush out and buy these expensive and powerful machines based only on a short test. We have a large investment—in both time and money—tied up in our Apple IIs. Still, after using a Macintosh, you begin to see the usefulness of the mouse. For control of text in MacWrite, image creation and manipulation in MacPaint, and in other programs, the mouse makes many things easier to do.

HARDWARE PROFILE

Name: The Apple II Mouse

Type: Peripheral

System: Apple II, II+, or IIe

Software: MousePaint software written by Bill Budge

Documentation: User's manual

Price: \$149

Summary: More than a novelty. The Apple II Mouse might change the way we use the Apple.

Manufacturer:

Apple Computer Corp.
20525 Mariani Ave.
Cupertino, CA 95014
(408) 996-1010

Say "Cheese"

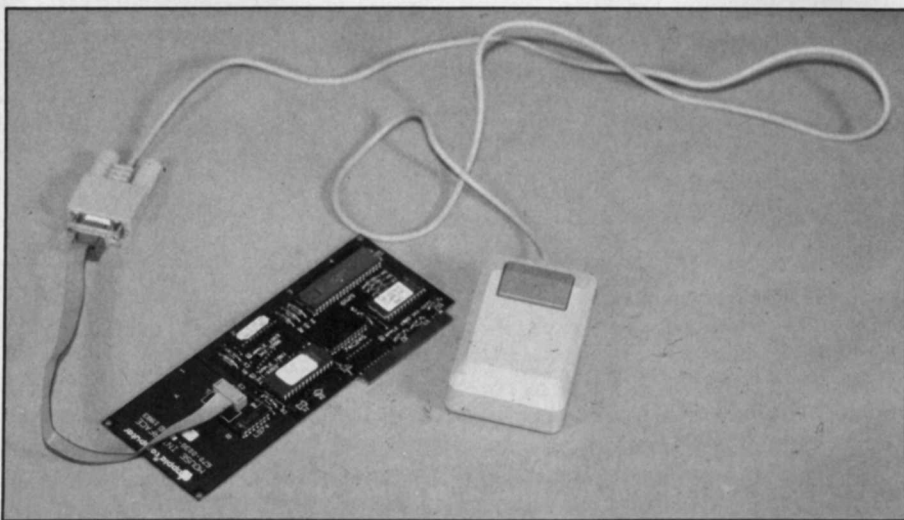
Now, there is a mouse for the Apple II series. It is the same mouse that Lisa and Mac use: a small, cigarette pack size box topped by a big grey button. On the bottom, it has a small rubberized ball held by a locking ring. When the mouse is placed on a tabletop, the ball is held against a set of motion detectors that convert your hand movements into signals that the computer can process.

As an analogy, think of a track-ball

Training the Mouse

The *MousePaint* software is a free-hand graphics program which incorporates different tools to convert mouse movements into patterns, shapes, brush strokes, lines, and curves. To select a tool, drag the pointer to the lefthand side of the screen. Place the pointer over a tool, click the mouse, and you are ready to take action.

The hand icon is used to pull more of the page into view, since the space you



controller on your favorite arcade game. The mouse is a more refined version of this game controller, turned upside down. Instead of using the cursor keys and a control-key sequence, you use the mouse to move a pointer across the screen to an icon or verbal menu selection. Action is initiated when you depress the button.

Included in the package is *MousePaint* software written by Bill Budge, a full-featured graphics package that is as close to MacPaint as many Apple II owners will get. And it has one feature that will make Mac owners jealous—color.

see on your monitor is only part of the total sketchpad. The pencil lets you make freehand drawings on the sketchpad. The spray can helps you shade your picture. The brush paints a swath of black in different widths on-screen. A straight edge draws straight lines at any angle, in various widths and patterns. If you make a mistake, the eraser quickly wipes clean any part of your drawing.

Five pairs of shape symbols are also available: rectangle, rectangle with rounded corners, oval/circle, free-form, and polygon. You may choose an outline shape or its solid form.

BASF QUALIMETRIC™ FLEXYDISKS.® A GUARANTEED LIFETIME OF OUTSTANDING PERFORMANCE.

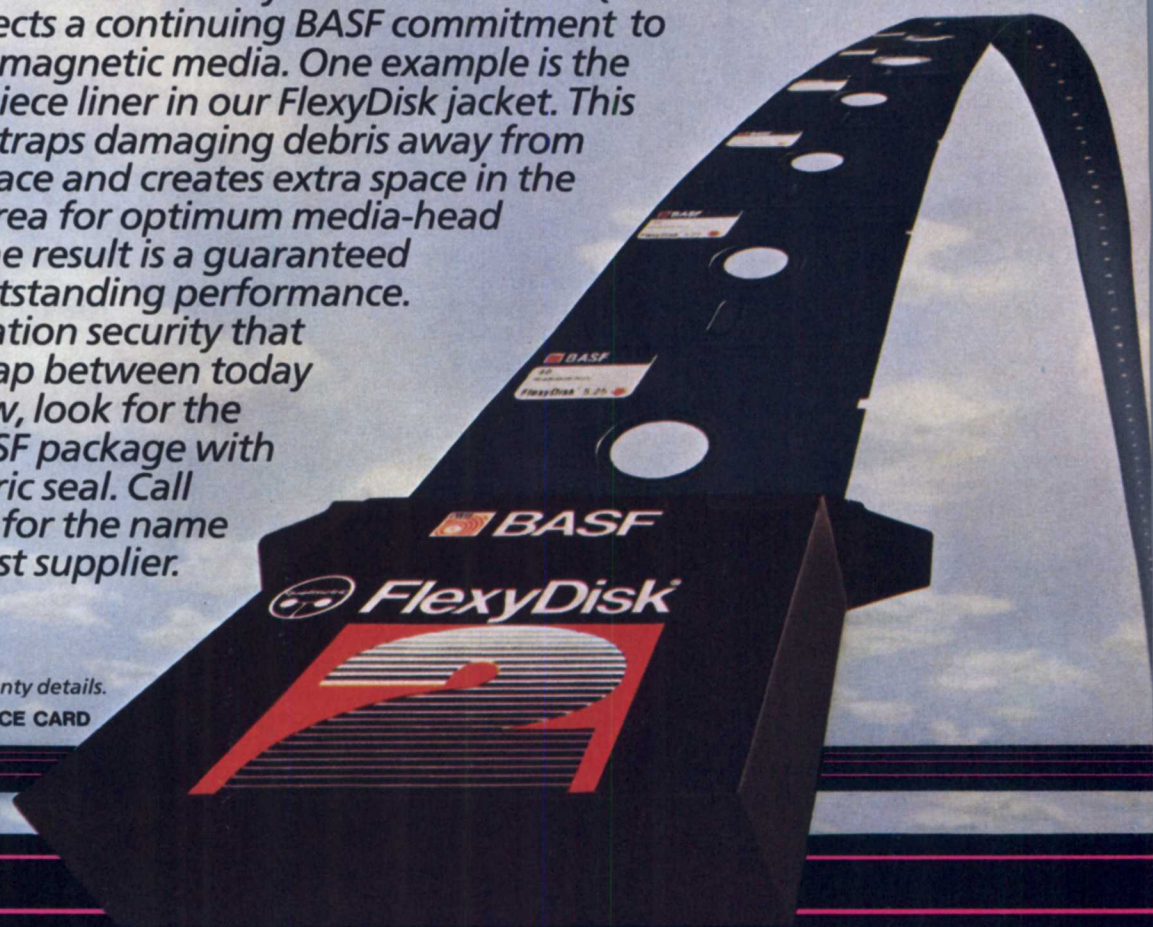
BASF Qualimetric FlexyDisks feature a unique lifetime warranty, firm assurance that the vital information you enter on BASF FlexyDisks today will be secure and unchanged tomorrow. Key to this extraordinary warranted performance is the BASF Qualimetric standard... a totally new set of criteria against which all other magnetic media will be judged.*

You can count on BASF FlexyDisks because the Qualimetric standard reflects a continuing BASF commitment to perfection in magnetic media. One example is the unique two-piece liner in our FlexyDisk jacket. This BASF feature traps damaging debris away from the disk's surface and creates extra space in the head access area for optimum media-head alignment. The result is a guaranteed lifetime of outstanding performance.

For information security that bridges the gap between today and tomorrow, look for the distinctive BASF package with the Qualimetric seal. Call 800-343-4600 for the name of your nearest supplier.

*Contact BASF for warranty details.

CIRCLE 107 ON READER SERVICE CARD



ENTER TOMORROW ON BASF TODAY.

© 1983 BASF Systems Corp., Bedford, MA



BASF



Editing a font with FatBits.

Colors and patterns are selected from the bar at the bottom of the screen. Move the pointer over your selection and click the mouse to select one.

The editor box can be dragged or "rubber banded" across the screen, letting you copy, invert, flip, or cut and paste graphics. Cut text is moved into a buffer and can be placed anywhere in the picture you are working on or onto another picture.

"Rubber banding" makes the drawing of lines and shapes very easy. Click a shape icon, such as rectangle, circle, free-style, or polygon, and move the mouse back to the drawing page. Click the mouse and drag it across the screen. As it moves, the shape is continually drawn, erased, and redrawn until you are satisfied and the mouse button is clicked again. The shape is *always* true, i.e., the sides of a square are always even and in proportion. Depending on how you "rubber band," a circle might be an oval, a flat disk, or a perfect circle.

Unlike other graphics programs, the background underneath an image isn't erased or changed; it is always there. Selecting Undo from the Edit menu erases the last drawn shape and restores what was behind it.

Fatbits is a magnified mode that blows up the portion of the page occupying the upper left of the screen, allowing editing of fine details. You use the pencil icon to turn on or off different blocks in the picture.

Five fonts—Toronto, New York, Athens, Venice, and System Font—are used to place text anywhere on the screen. Select a font from the menu, click the text icon (a large letter A), and move the cursor to the point where text should begin. All keyboard characters are available, including DELETE.

MousePaint is one of the easiest and most responsive graphics packages I have used. It does have three drawbacks, however. The pencil and paintbrush icons draw only with black or white ink. Colors aren't allowed. Second, you can Undo only the last command. You can't do a series of Undo's to erase successive steps. And finally, the clipboard holds

just one cut image at a time. These may be minor points to you, however. I found it both enjoyable and instructive to work around these limitations.

Windows

Like the Mac and Lisa, *MousePaint* features overlapping menus and windows. One gives information about *MousePaint*. Another lets you set the size and type of brush, and the third shows a miniature view of what the page will look like when printed on the Apple Imagewriter printer. The final window is used to select a font.

The menus follow the Mac/Lisa scheme. At the top of the screen is a bar with the names of different menus: File, Edit, Aids, and Font. Point to one, press the mouse button, and the menu slides down onto the screen. Moving the pointer to a menu option activates it. When the mouse button is released, the menu disappears.

Mouse Technicalities

The Apple II Mouse includes a 5-chip interface card with its own 6502 microprocessor and ROM routines which make the mouse a good deal more responsive than any game controller. The dedicated 6502 frees the Apple CPU for other tasks and speeds mouse operations. The Apple II Mouse may be installed in any slot, though slot 4 is recommended.

Because you use the mouse by moving it around a table top, you will need to set up a clean working area. The work space should be next to your Apple and about one foot square.

Software and Documentation

In addition to the *MousePaint* program, a short tutorial on how to move and use the mouse is included on disk. I wish that Apple had included some sample graphics, perhaps the same graphic in different stages of completion. Disk space may have been a problem, though. You can save only one picture on the *MousePaint* master. *MousePaint* files can be saved on any proDOS formatted disk, and the master is unprotected.

The documentation is a 56-page booklet that explains how to clean the mouse, what the various icons mean, hints on easier shape drawing, and how to write mouse programs. It is written in Apple's usual style—understandable, readable, and very friendly.

Survival of the Fittest

Can the Apple II Mouse make it? Is mouse technology the way the future will be, or is it just a novelty? Sure, *MousePaint* is fun to play with, but what else can you do with it?

First, the mouse works. It is respon-



A MousePaint drawing.

sive, fast, and transparent—i.e., you get used to it quickly. Using the mouse with *MousePaint* makes me want to use it in conjunction with other programs, such as *AppleWorks*. That leads us to a sensitive question. Will there be software that can use the mouse?

We hear that Bill Budge is at work on more software for the mouse, including a graphics toolkit and other goodies that will help make the Apple II look like a Macintosh. And we won't have to wait long for a mouse-based *Pinball Construction Set*.

Other developers are working on converting existing software for use with mice. The Electronic Arts personal productivity line will use the mouse, as will the graphics series from Penguin Software.

Not every program will benefit from mouse technology, however. Where keyboard use is vital, a mouse interface is a luxury.

Other than the conversion of existing software, what does the future hold? Are there any applications that are perfect for a mouse interface? One potentially intriguing area is in communication for the motor-impaired. One system of communication, called Bliss Symbolics, uses iconic representations of different actions and words. A hand pointer is moved across the board, and the symbols are read and interpreted by another person.

A mouse is just a pointer. With a speech synthesizer, intelligent software, and the Apple II Mouse, the disabled would be able to better communicate with the world. The software could collect the symbols and print or speak complete sentences. The relative low-cost and ease of use of an Apple II makes such a system practical.

The real test of the mouse will be on the Macintosh or the Lisa. Those systems demand a mouse interface. The Apple II will be the proving ground. If intelligent software is written, and if the \$149 price tag isn't seen as too high, the Apple II Mouse should have a long, prosperous life.

CIRCLE 419 ON READER SERVICE CARD

READ ONLY



A review of the IBM Personal Computer family: Summer 1984



UP AND RUNNING

And Swimming, Building, and Baking. Building and baking? They don't produce gold medal winners, but they do figure in staging the Olympic games. So do 200 IBM Personal Computers (including software) that are part of IBM's sponsorship of the 1984 Olympics in Los Angeles. In fact, IBM PCs are hard at work in both sports and administration.

PCs are involved in a wide range of planning and analytical activities, though they don't provide official results of the various athletic events. Some events, for example, use the IBM PC to determine how competitors are seeded—who competes against whom. In other events, such as archery, the PC simplifies the complex task of recording scores and compiling statistics for each athlete as the competition progresses.

In events like gymnastics that depend on points awarded by judges, statistics can be kept on the PCs to analyze scoring consistency. Also, a whole range of information about individual athletes, past Olympics, and

world and national records, both past and present, can be quickly recalled and compared with the help of the IBM PC.

Last but not least, administration. Spreadsheet programs, such as IBM's Multiplan™, were used on the PC for planning and forecasting by nearly every administrative department, from Construction to Ticketing. The same departments speed up some of their day-to-day accounting tasks with the help of the PC and IBM accounting packages.

Departments with specific software needs developed special packages with the assistance of a programmer whose services are part of IBM's Olympic sponsorship. Specially designed programs include database management applications to help handle transportation requirements and inventory control programs to keep track of sports equipment and personnel records.

In short, there's hardly an area of planning and staging the 1984 Summer Olympics that the IBM Personal Computer doesn't play a part in. Maybe there *should* be medals for administration.

Multiplan is a U.S. trademark of Microsoft Corporation.



ON THE STOREFRONT

A Shorter Distance between PC Points. We're all familiar with the feeling of being lost in the growing maze of new computer products. IBM has opened a path through that maze, straight to the information and answers you need about IBM Personal

Computer Products—information about a specific software package or hardware configuration and answers to technical questions.

The key to entering this new information path is the IBM Customer Support System (CSS) at your authorized IBM Personal Computer retail dealer or IBM Product Center. Dealers in over 300 cities throughout all 50 states use the Customer Support Sys-



tem, which includes a nationwide communications network, to help give you instantaneous computer-age service support that's unmatched by any other computer manufacturer.

Colorful Stops along the Way. More than 1,700 authorized IBM dealers have access to a permanent and continually updated directory of IBM Personal Computer product information in IBM's Customer Support System. For a sharp color display of the type and level of information you want, visit your dealer or IBM Product Center and choose from lists of options displayed on an IBM PC color monitor. There are choices that guide you quickly and easily from product directories to in-depth product demonstrations and configuration information.

Since knowing how to take the first step is often a problem, CSS gives you a variety of possible starting points. By selecting the appropriate category—such as printers or business software—you can move to a list of specific products and then to the



Information from CSS with simple one-key commands

product demonstration you want. If you know a product name to begin with—Word Proof, for example—CSS will make an alphabetic search for it. To keep you up-to-date, there's also a special listing for new product announcements.

You can browse through the CSS displays at your own pace, pausing at a given spot or moving quickly backward or forward by using simple one-key commands that are always displayed at the bottom of the screen. One of these commands enables you to make print-outs of any information you wish to save for future reference.

The IBM PC family's color graphics capabilities make the CSS software demonstrations especially impressive. The Multiplan demonstration, for example, consists of several consecutive screens of information. Each screen is split vertically, with representative sections of the actual program on the left and explanatory text on the right. By the time you've seen the entire demonstration, you'll have a good idea of both *what* the program can do for you and *how* it does it.

Answers at the End of the Line. Over 1,000 authorized IBM retail dealers and IBM Product Centers are linked through their Customer Sup-

port System to the IBM Information Network. This nationwide communications capability helps your dealer give you fast, efficient service. Warranty claims, for instance, can be handled through CSS with a minimum of paperwork and delay. Dealers also use the network to communicate with other dealers and with IBM to keep abreast of the latest product and service information.

In addition, the CSS network is your gateway to technical information about the IBM Personal Computer family of products. IBM maintains a database on a 3033 mainframe in Tampa, Florida, that your dealer can use to answer—within minutes—a wide range of questions. If the solution isn't on hand in the database, your question can be submitted through CSS to a technical support staff in Boca Raton. There, it will be analyzed and an answer returned through CSS to your dealer.

The information used to answer your inquiry is added to the CSS database, where it will be immediately available for anyone else with a similar question. Your technical inquiries therefore contribute to the growth of the Customer Support System. Its on-line product information, color graphics displays, and advanced communications all have a single purpose—to help you get the most out of your investment in IBM Personal Computer hardware and software products.



HARDWARE NEWS

Color. There's color news for the IBM PC, IBM PC XT, and IBM *Portable* PC in the form of the IBM Personal Computer Color Printer. It's a high-performance, dot matrix printer that can print charts, graphics, artwork, and text in up to eight colors. The Color Printer produces color graphics that can enhance the appearance of your reports and presentations and make the information they contain even easier to understand. It can also type directly onto overhead transparencies.

The IBM PC Color Printer's range of performance features make it especially well suited for heavy-use/high-productivity applications. A near letter quality printing mode is standard. Printing speeds of up to 200

characters per second can help save time. So can programmable automatic control of print requirements such as print mode, line spacing, and margin and tab setting. These programmable features act as an extension of many software products—word processing programs, for instance—and can be initiated with just a few keystrokes.

A final feature for those who like a personal touch. You can use the Color Printer to personalize your documents by varying the printing modes, character spacing, and boldness. This allows you to differentiate



The IBM PC Color Printer

among headlines, subheads, and quotations and even to print math and science equations.

The Big Crunch. Not long ago, computing and number crunching were nearly synonymous. Personal computers and software for everything from office management to agriculture changed that, but the need for heavy number crunching has hardly disappeared. If it's still a part of your computer workload, the IBM Personal Computer 8087 Math Co-processor can help speed up your calculations.

The 8087 is a floating point co-processor that multiplies, divides, adds, subtracts, exponentiates, and performs trigonometric and logarithmic functions. It works together with the PC's 8088 processor to improve the execution speed of floating point operations by as much as 10:1. The Math Co-processor increases calculation speeds so greatly because it makes floating point operations a hardware rather than a software function.

In addition to increasing the speed—and often the level of precision—of statistical and analytical math packages, the Math Co-processor can improve the display speed of graphics and video games. It also significantly improves high-level language execution time, and is designed to work with the APL Interpreter and the version 2.0 Pascal and FORTRAN Compilers discussed next in this issue.



WHAT'S THE PROGRAM

We Speak Your Language. IBM Personal Computers are shameless polyglots. They can handle most of the popular programming languages you want to work with. Much of the credit for their versatility goes to the IBM Disk Operating System (DOS) 2.10. This updated version of DOS 2.00 was developed to provide support for the IBM PCjr as well as for the IBM PC, PC XT, and IBM *Portable* PC. So all members of the IBM Personal Computer family are united by a single master program that provides the required support between their hardware and a wide range of application programs.

More to our present linguistic point, the DOS 2.10 diskette contains two programs, Disk BASIC and Advanced BASIC, to help you write your own programs on an IBM PC. (IBM PCjr BASIC—a separate, optional cartridge—provides this support for the PCjr.) Disk BASIC adds DOS file support, date, time of day, and communications capabilities to the BASIC language that comes with every personal computer from IBM. Advanced BASIC adds advanced key trapping and advanced graphics—including viewports, windows, and paint tiling—plus music and other capabilities.

DOS has other features that help simplify advanced program development and design, including a line editor, a linker, background printing, and chaining of commands. For help with writing and editing particularly sophisticated BASIC programs, there's the BASIC Programming Development System, a software package that consists of two programs and four utilities. The first program includes a Text File Editor and a Structured BASIC Pre-processor; the second includes a BASIC Formatter and a BASIC Cross-Reference.

Native Translators Available. The IBM BASIC Compiler compiles or translates the BASIC programs you've written, down to native object code so they'll run on your IBM PC. And BASIC is just the beginning. DOS also provides the support you need to develop and run programs using the IBM Personal Computer Macro Assembler or the FORTRAN, COBOL, and Pascal Compilers.*

Two of these, the FORTRAN and

Pascal Compilers, are available in recently updated versions. IBM PC Pascal 2.0 is based on the ISO standard, and IBM PC FORTRAN 2.0 conforms to the ANSI-77 standard subset level. Both new versions feature improved arithmetic capabilities, and both support the IBM 8087 Math Co-processor for greatly increased speed in processing floating point calculations. (For more about the Math Co-processor, see "Hardware News" in this issue of *Read Only*.)

In addition, versions 2.0 of the FORTRAN and Pascal Compilers feature a Library Manager for creating user-defined libraries and provide easy access to all files in any subdirectory through DOS path support. FORTRAN 2.0 supports linking of object modules with subroutines written in Pascal 2.0 and vice versa. Both new versions support linking of object modules with subroutines written in IBM PC Macro Assembler.

There's a bargain in store for those who already own the 1.0 versions of these compilers: you have the option of buying an upgrade to the 2.0 version at a substantial savings from the full 2.0 price.

To ensure that your programming reach doesn't exceed your grasp, the IBM PC APL Interpreter enables you to write and edit your own programs in APL. It can also be used to exchange data files and workspace between your IBM PC and many mainframe computers.*

Finally, if you're inclined to make serious use of the IBM PC's array of programming aids, we suggest that you also take a look at the recently announced IBM PC Sort program. It provides support for data types and file organizations used by the IBM DOS-supported languages mentioned

or files, merge multiple input files, selectively include or exclude records, and create an output file containing the records, pointers, or keys from the input files. There are no arbitrary limits in IBM PC Sort for file size, record length, number of keys, or number of input files.

*BASIC Compiler and Macro Assembler will run on the IBM PCjr. APL Interpreter will not. Although the IBM PCjr does not support FORTRAN, COBOL, and Pascal Compilers, most of their output will run on the PCjr if there is sufficient storage.

Now Get Organized. The IBM PC's ability to run a wide variety of commercially available programs and to help you develop your own applications may result in a good news/bad news situation. The good news is that you'll be able to satisfy your application requirements. The bad news is that you'll probably be the one responsible for keeping track of your growing library of programs. If, as we've often found, enthusiasm outstrips organization, you may find yourself falling behind—especially if you're working in an area, such as



Animation Creation software from IBM

small business finance or education, where programs multiply rapidly.

Fortunately, help is in sight, in the form of Fixed Disk Organizer, an IBM software package that does just what its name suggests.

Fixed Disk Organizer has a master menu that lets you sort out your various application programs by category—word processing, spreadsheet, communications, and so on. You can tailor the menu to your specific application needs by adding new menu categories, revising or deleting existing categories, or changing titles. The master menu allows you to review all the programs stored on your fixed disk at a glance and to call them up quickly with just a couple of keystrokes.

Fixed Disk Organizer also helps protect sensitive data by allowing you to create passwords and restrict access. It also enables you to write a



Application development tools from IBM

above and can significantly speed and streamline your programming efforts.

IBM PC Sort can be used as a stand-alone utility, integrated into a batch job stream, or invoked directly from a COBOL program via the Sort verb. It can sort records from a data file

string of complex DOS commands into a batch file and execute them whenever you want simply by selecting that file from the menu. And in case part of your organizational problems stem from not always remembering just how things are organized, you can use Fixed Disk Organizer to establish Help files as a reminder.

So we're all in trouble—no more excuses for not being organized.

Moving Pictures and Mathematical Castles. Let's not forget that there's more to life than programming, compiling, and getting organized. There's also software from IBM for pure enjoyment and for enjoyable education. Two such packages are Animation Creation and Adventures in Math.

Adventures in Math incorporates math drills into an adventure game with vivid color graphics of a castle and its passageways and treasures. To find the way out—and to uncover as many treasures as possible along the way—children (or particularly skillful adults) have to solve basic math problems. The program's difficulty level increases as you solve the problems you're confronted with.

Using Animation Creation, you or your children can draw your own pictures and watch them come to life. To draw pictures, you select from 254 computer characters and position them on your screen. Add color by choosing any of 16 foreground and 8 background colors. Then, by slightly repositioning the images on successive screens, you can create animation.

Next stop, Hollywood.



HARDCOPY

You Can't Enjoy the Game without a Program. Earlier in this issue (see "On the Storefront"), we discussed the Customer Support System for on-line information about IBM Personal Computer products. Much of that information is also available in two publications: *The Guide*, a directory of Personal Computer offerings from IBM, and *The Library*, a directory of IBM Personal Computer software offerings. If you want to enjoy the personal computer game, these are the "programs" you need to do it.

The Guide, published twice a year, is a catalog that contains clear, concise descriptions of IBM PC, IBM PC XT, IBM PCjr, and IBM *Portable* PC systems. It also reviews printers, video displays, expansion units, and all other IBM PC hardware products. A separate section of *The Guide* contains articles on IBM PC software packages.

Both hardware and software articles are illustrated



with annotated color photographs—of key screens of the software packages—and start with charts that provide quick product overviews. Other noteworthy features include sample configuration tables for all three systems and a closing section on Sales and Service Support.

The Library, updated quarterly, presents an overview in booklet form of the entire IBM PC software product line. It presents the software by category, with sections on Operating Systems and Languages, Personal Productivity, Communications, Business, Education, and Entertainment. Program descriptions are brief and to the point. Each includes a short overview, program highlights, and system requirements. There's also a chart at



the end of the booklet that shows at a glance which programs are compatible with the IBM PCjr.

Or the Hardware without a Manual. If *The Guide* and *The Library* are the general road maps to IBM PC products, the *Technical Reference* and *Hardware Maintenance and Service manuals*—now available in newly updated versions—are the detailed maps of downtown. It's not a trip everyone wants to take, but if you do, these are the right directions.

There's a three-volume *Technical Reference* set for the PC and another for the PC XT and *Portable* PC. These manuals include the functional specifications for the system units and for the options and adaptors in the IBM PC product line. The *Hardware Maintenance and Service* manual details many aspects of troubleshooting a personal computer from IBM. It includes a parts catalog, a section on preventive maintenance, and instructions for identifying the failure of a replacement unit.

*These manuals are intended for use by technically qualified service personnel.



TIPS AND TECHNIQUES

If you use Personal Editor—IBM's full-screen editor for writing programs and brief documents—but find yourself displaying the Help file whenever you forget a function key assignment, here's a little help from the fellow forgetful.

Function key assignments can easily be displayed on the command line of your Personal Editor screen by assigning F1 to display the unmodified keys and alt+F1 to display the alt+Fx keys. You can then assign the Help function to alt+H, although you probably won't need it nearly as often as before.

The macro for the F1 assignment can be written as follows: def f1 = [cursor command] [begin line] 'F: 2=Save 3=File 4=Quit 5=Erace 6=EraceEOL 7=Print 8=Switch 9=InsL 10=Ins&Indr' [cursor data].

For more information about IBM Personal Computer products, see your authorized IBM Personal Computer dealer or IBM Product Center. To learn where, call 800-447-4700. In Alaska and Hawaii, 800-447-0890.

The Best Costs Less



SOFTWARE EVALUATION

George Blank

For years, programmers have been arguing the relative merits of different computer languages. They often miss the point. The language may not be as important as the implementation. Consider the relative merits of two cars: a Rolls Royce might be a better car than a Ford, but I would prefer a new Ford to a Rolls that just had a head-on collision with a train.

Theoretically, Pascal is a language far superior to Basic. To quote Edsger Dijkstra, "It is nearly impossible to teach programming to anyone with a prior exposure to Basic." Learning Basic as a first language practically guarantees that a programmer will develop bad habits, including spaghetti coding, cut and try programming, inadequate internal documentation, abuse of global variables, and a failure to avoid side effects.

Problems With Other Pascals

Until recently, the Basic vs. Pascal controversy was irrelevant to IBM PC users. The computer has a powerful, full featured Basic, while the first three versions of

Turbo Pascal

Pascal I obtained for the PC all had serious flaws. Pascal MT+ at that time worked only under CP/M. UCSD Pascal demanded exorbitant fees from programmers who wanted to sell programs written under the system, which was also slow, clumsy, and not very accurate. IBM or Microsoft Pascal lacked the most fundamental extensions for serious programming: program chaining, cursor control, and screen handling functions. Despite these inadequacies, all three charged \$300 and up for their mediocre versions of Pascal.

Of the three, IBM Pascal seemed the best choice. So I spent weeks developing routines for cursor and screen control. I paid \$100 for a routine to allow program chaining, only to have the program fail if I tried to use it in a different machine. Even after I developed a batch file to speed up the compilation process and reduce the typing necessary to name 12 intermediate files generated by the compiler, I tolerated four minutes of disk swapping to compile even the smallest program.

The intermediate code was so grossly inefficient that my 360K disk drives were inadequate for moderate size programs. I

had to break the programs down into smaller units and compile them separately. After one year of using the system, I still could not produce a reliable turnkey package.

Then I saw an advertisement for Turbo Pascal. The ad promised everything I needed at the ridiculous price of \$50.

The ad promised everything I needed at the ridiculous price of \$50.

Built-in functions included ClrScr to clear screen and GotoXY to position the cursor. Program chaining was supported, with compiler options allowing the creation of either COM files or chain modules that used less memory. It was even possible, the literature promised, to compile and run a program directly from memory. I sent for the program.

I had so much time, effort, and money tied up in the IBM Pascal version of my programs that I avoided switching over for three weeks. But when I found that a



SOFTWARE PROFILE

Name: Turbo Pascal

Type: Language (compiler)

System: IBM PC, PCjr, MS-DOS, CP/M-86, CP/M

Format: Disk

Language: Machine

Summary: Outstanding value

Price: \$50

Manufacturer:

Borland International
4807 Scotts Valley Dr.
Scotts Valley, CA 95066

menu chaining routine I wrote for one PC wouldn't work on another PC, I gave up, expecting that I would have to start over from the beginning. Instead, I found that it took me less than 30 minutes to convert a program written in IBM Pascal to Turbo Pascal.

Short programs that had taken four minutes to compile now compiled in 10 seconds. Longer programs that had taken 20 minutes to compile now took less than a minute. And a program that I had to compile in four pieces under IBM Pascal compiled in one piece!

I have been working on a series of 60 programs; under IBM Pascal, the average program took two weeks to write. With Turbo Pascal, the average is now two days. And program chaining, so necessary for turnkey applications, worked the first time I tried it.

Limitations

To date, I have found only two significant limitations to Turbo Pascal. First, it creates only COM files, while IBM Pascal creates EXE files. The difference is that COM files always load into the same area of memory, while EXE files are relocatable. It is possible with IBM Pascal to have several programs in memory and switch between them without disk access. Aborting a program called from a menu program returns you automatically to the menu. The same is not true of Turbo Pascal.

The second limitation is that Turbo Pascal limits you to 64K of program and 64K of data in each program, while MS-DOS allows much larger programs if you have either a hard disk or the patience to compile dozens of modules and units.

Turbo Pascal follows the Jensen and Wirth standard for Pascal closely, with only a few justifiable omissions. Mark and Release are used with pointer variables instead of Dispose. Read and Write have been extended to handle all I/O needs, eliminating the need for Get and Put, which are not implemented. Goto statements are limited to the current block, but no self-respecting Pascal programmer uses Goto, anyway. Page, Pack, and Unpack are not implemented; all are minor functions.

Enhancements

There are many enhancements to the Pascal standard in Turbo Pascal, including a set of string functions, random file handling, screen control, DOS primitives, random number generation, and memory management functions. The built-in procedure MsDos allows direct access to DOS, with a set of dependent functions and procedures and control over all registers. The procedure InLine allows machine code to be embedded in your program, with other features such as optional absolute addressing and predefined types Addr,

Here is a direct translation of Dave Ahl's Basic benchmark:

```
program AhlsSimpleBenchmark;
var n, i : integer;
    a,r,s : real;
begin
  a := 0.0; r := a; s := a;
  for n := 1 to 100 do
    begin
      a := n;
      for i := 1 to 10 do
        begin
          a := sqrt(a);
          r := r + random
        end;
      for i := 1 to 10 do
        begin
          a := sqrt(a);
          r := r + random
        end;
      s := s + a
    end;
    writeln(abs(1010 - s/5));
    writeln(abs(1000 - r))
  end;
```

Turbo Pascal Benchmark results on an IBM PC jr:

Time	Accuracy	Random
0:59	0.0000000000E+00	1.5178304262E+01

Ofs, Seg, CSeg, DSeg, SSeg, Byte, Mem, MemW, Port, PortW, and Word for direct machine control. You can also link to external subprograms.

Turbo Pascal comes with a built-in editor, which is very similar to *WordStar*, with 38 commands. You can also set up a keyboard translation table, so I changed my keys to match the functions of *Perfect Writer*, which I use to write programs. I use the built-in editor only for minor changes to programs, since I prefer the dual windows, text movement, and search functions in *Perfect Writer*. If you compile from memory and encounter an error, either during compilation or at run time, Turbo Pascal automatically locates the line in which the error occurred, and after printing an error message, puts you in the editor at that location.

Usually I program with *Perfect Writer* in my Seequa Chameleon and Turbo Pascal in my IBM PCjr. The monitor for the PCjr sits on top of the Chameleon. I save the program to a DOS 2.1 disk (one key stroke), put the disk in the jr, and execute it (two more keystrokes). That way I can adjust the graphics or fix bugs while watching the program on one screen and editing it on another.

Turbo Pascal is lacking in graphics functions, probably to keep one manual compatible with various Z80 CP/M, CP/M 86, and MS-DOS machines. I use a set of procedures developed by Richard Koch that add the ability to set graphics modes; set, reset, and test points on the screen; and draw lines and circles on the IBM and compatible computers. (I have Dick's

permission to send a printout of the routines to readers of this article for \$2 and a self-addressed envelope.)

Documentation

Turbo Pascal comes with a 250-page perfect bound instruction book that is of above average readability for a technical manual. (I can recognize English, French, Greek, Hebrew, Italian, Japanese, Thai, Spanish, Latin, Arabic, Coptic, German and Russian, but I still haven't figured out what language IBM uses in their Pascal manual.)

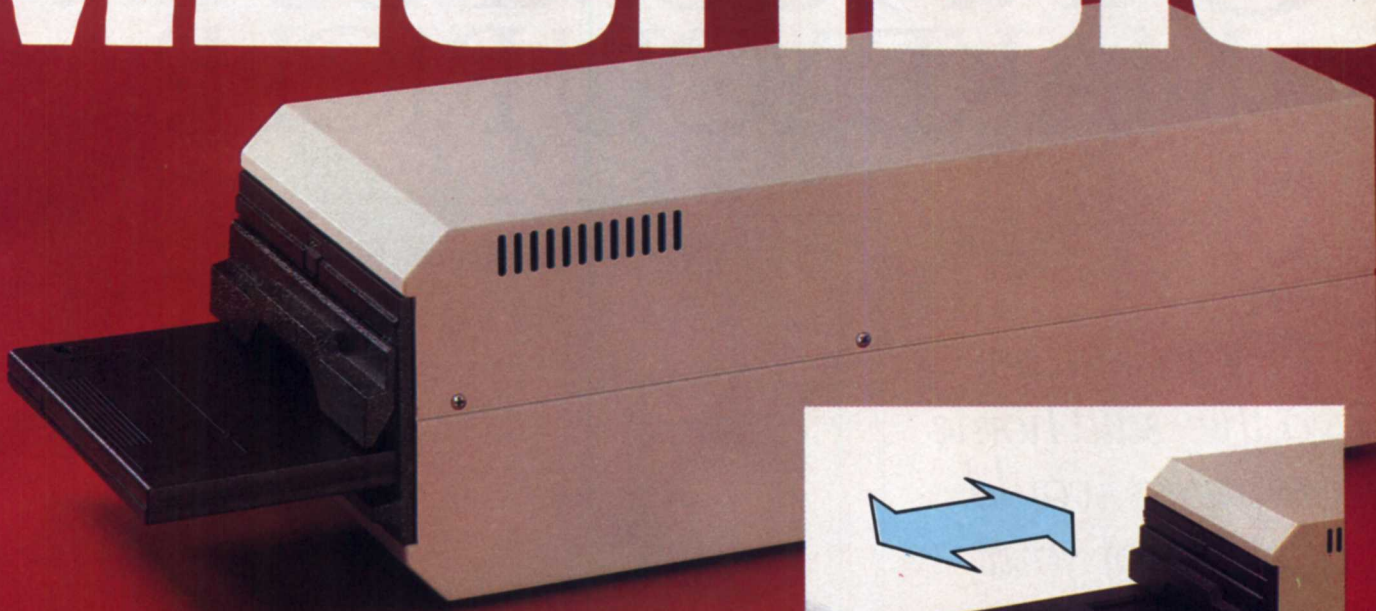
Many explanations are cursory, and examples are too few and too limited, especially for functions unique to Turbo Pascal. The manual also contains several typographical and a few factual errors. I was able to obtain some limited and only partially accurate technical help by calling Borland International. Microsoft's tech support was better; IBM's far worse!

Borland recently eliminated my only other complaint about the package by dropping the \$100 license fee it previously charged users of Turbo Pascal for reselling programs written with it. The \$50 purchase price now includes unlimited rights to write programs using the compiler and sell those programs in the commercial market.

My only fear for the program is that at \$50, it is grossly underpriced, and I worry that people might fail to take it seriously. That would be a shame, for this is a terrific package, whether for learning Pascal or for software development.

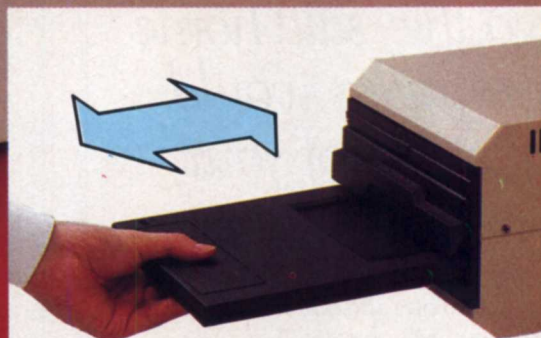
CIRCLE 403 ON READER SERVICE CARD

WE'LL MAKE YOUR APPLE* GROW MEGABIG!



The Infax 101A subsystem can add 10 megabytes of storage capacity to your Apple*, Apple II, Apple III. Coming soon Macintosh and Lisa!

That's megabig! The Infax removable disk cartridge subsystems provide performance, capacity, speed and convenience. Engineered specifically for the Apple* owner, this system has a removable disk cartridge that is equal in capacity to 69 floppy disks. Contained in a newly designed cabinet, the Infax 101A features state-of-the-art engineering that makes it more resistant to shock and vibration than any other fixed or removable disk drive. With its proven high performance Infax brings the Apple* owner a removable disk cartridge subsystem that is second to none.



The Infax removable disk cartridge is the ultimate convenience.

Only a little more than 8 by 10 inches in size, the disk cartridge easily slides in and out of the 101A and 102A. A specially designed electronic locking system protects an operating environment that is both efficient and fail-safe. In fact, both Infax systems offer the fastest start/stop (cartridge replacement) of any high performance disk drive.



Introducing the Infax 102A . . . it's megabigger and designed for the up-scale Apple* owner.

Imagine 20 megabytes of storage capacity in a cabinet barely larger than an electronic typewriter. Containing 2 disk drives, the Infax 102A features all of the engineering technology of the 101A and more. Lightweight, this removable disk cartridge subsystem provides the same capacity of many less portable mainframe computers and at a fraction of the cost.

Infax is a registered trademark of D² Products. Apple*, Apple II, Apple III, Macintosh, Lisa ProDOS and SOS are registered trademarks of Apple Computer, Inc.



**Vufax, Incorporated
5301 Covington Highway
Decatur, Georgia 30035**

**For more information or the
name of your nearest Infax
dealer call (404) 981-6778.**

[WHAT IF IT JUST PAID FOR ITSELF?]

CAN A COMPUTER MAKE YOU RICH?

A few years ago, they said home computers would take care of your personal finances.

They would give you faultless advice on when to buy and when to sell. The implication was, they would make you rich. But until now, they did just the

opposite.

We're about to change all that with a program called *Financial Cookbook*. It's the first home computer program actually designed to save people money.

And while *Financial Cookbook* alone will not make you wealthy, we think it will do more in that direction, for more people, than any other home computer program to date.

One reason for this is that *Financial Cookbook* is easy to use. It combines the computing power of a pre-programmed spreadsheet with the simplicity of a basic calculator.

SAVING MONEY WITH IRAs

Compares growth of IRA deposit with regular savings deposit

Amount of deposit \$2000
Years to analyze 30
Interest rate earned 10.5
Compounding periods 365
Marginal tax rate 54.5

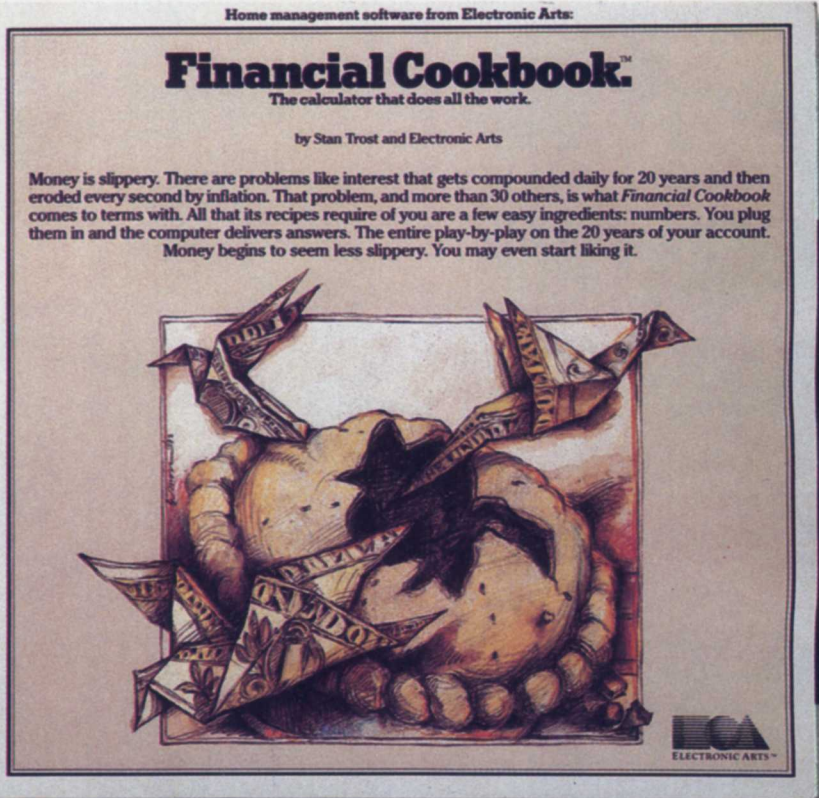
Ending savings interest \$ 4633
Ending IRA balance \$23408

TR	INTEREST	TAXES	BALANCE	IRA BALANCE
NOW	\$ 0	\$ 0	\$1104	\$ 2000
1	\$ 96	\$ 44	\$1154	\$ 2177
2	\$ 185	\$ 46	\$1211	\$ 2371
3	\$ 268	\$ 48	\$1274	\$ 2581
4	\$ 345	\$ 51	\$1347	\$ 2810
5	\$ 419	\$ 52	\$1422	\$ 3058
6	\$ 494	\$ 55	\$1471	\$ 3330

COMPUTE INDEX PRINT SAVE CATALOG

Arrows select setting, ESC exits screen

There are more than 101 questions *Financial Cookbook* helps you answer. This is a peek at just one of them.



But more important are the ways *Financial Cookbook* can show you how to save money. Like how to make thousands of dollars by borrowing to start an IRA. How to pay off your home mortgage 10 years sooner with half the interest charge, by paying only \$100 more a month. How to get \$20,000 more retirement income from a \$2,000 investment. And many, many more questions — on subjects from alimony to tax shelters — that we don't have the space to list here.

We do, however, have a revealing

booklet called *101 Easy Ways to Save Money With Financial Cookbook*. If you call (415) 572-ARTS, we'll send you a free copy. Or you can stop by your Electronic Arts dealer and pick up a copy. The booklet of course, just lists the questions. To get the answers, we think it's only fair to ask you to buy *Financial Cookbook* itself.

We can't promise it will make you rich. But we're pretty sure that for \$50*, it will pay for itself in record time, and maybe even pay off that promise you invested in called a computer.



ELECTRONIC ARTS™

FINANCIAL COOKBOOK IS A FEATURED PRODUCT ON THE NEW APPLE IIc and will work with Apple II, II+, and IIe computers (with or without mouse), the IBM PC and PCjr, Commodore 64, Atari home computers and all Apple and IBM PC 100% compatibles. Apple is a registered trademark of Apple Computer, Inc. IBM is a registered trademark of International Business Machines, Inc. Commodore is a registered trademark of Commodore Business Machines, Inc. Atari is a registered trademark of Atari Computer, a subsidiary of Warner Communications, Inc.

*Suggested Retail Price.

THE PRINT SHOP

At Last, a Graphics Program Even an Editor Can Use



SOFTWARE EVALUATION

Betsy Staples

I usually feel uncomfortable with issues of *Creative* that deal with graphics, for I am a truly uncreative person when it comes to the graphic arts. I was somewhat creative and exhibited a fair amount of artistic inclination up until the time I was about eight years old. There my artistic development was arrested; I still have the artistic abilities of an eight-year-old.

When faced with an exciting new graphics program, graphics tablet, or even the Macintosh, I freeze. If pushed by onlookers

who assure me that anyone can create with this gadget, I can usually muster a perfunctory squiggle or two before sliding off the chair and attempting to vanish in the nearest crowd.

The problem is simply that I cannot think of anything to create, even given the wherewithal (as with the Mac) to create almost anything imaginable.

Imagine my joy, then, when I saw a demonstration of *The Print Shop* from Broderbund. A few seconds into the demo, I knew this program was for me—and others of my ilk. I could hardly wait to get my disk drive around a copy.

When my copy arrived, I was not disappointed; I created things—cards, signs, letterhead, all kinds of artistic, clever things.

The program is entirely menu-driven. All you have to do is choose the elements

you want in your masterpiece, and *The Print Shop* does the rest.

From the opening menu, you first choose Setup to tell the program what sort of printer and interface you are using. The printers supported are Epson, C. Itoh (Pro-writer), NEC 8023A, Apple Dot Matrix, Apple Imagewriter, and Star Gemini.

As you begin to create in earnest, you work your way through the menus, using the keyboard, a joystick, or a Koalapad to make your selections. First, you specify whether you want to create a greeting card, letterhead, sign, or banner. Then you choose one of the nine border designs. For the background of your creation, you can have either an overall pattern made up of one of the ten abstract "tiles" or a scattering of one of the dozens of pictures (train, teddy bear, champagne bottle, disk, computer, heart, etc., etc.) and symbols that are available in various sizes.

Since you probably want to communicate something verbally with your masterpiece, you must also choose one of the eight typesets that can be printed in three sizes and in solid, outline, and three-dimensional format. You then type your message, specifying whether you want it centered or right or left justified. The message is artfully reproduced complete with sophisticated kerning or proportional spacing which enables small letters to snuggle up to their taller and wider brothers



An 8½ x 11" sign.

and sisters. Typing errors are easily corrected right on the screen.

For those who feel compelled to personalize their cards and signs even further, there is a graphic editor that allows you to create your own graphics or modify those that come with the program. The KoalaPad is particularly useful in this mode.

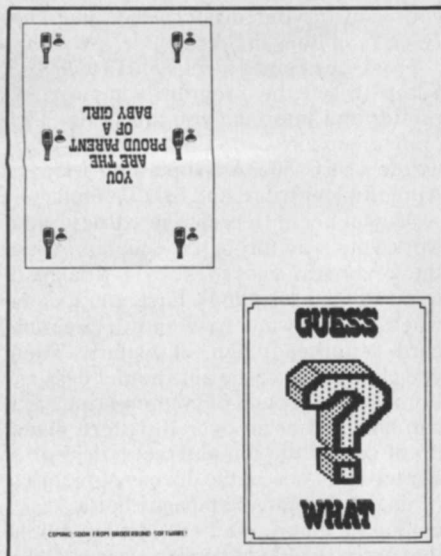
The Screen Magic option is a screen dump utility that allows you to print any

CONNIE CONEHEAD'S CONIFER SHOP

77 PINE TREE ALLEY / TOLEDO, KENTUCKY 54321

One of many ways to set up a letterhead.

July 1984 © Creative Computing



On a single pass the Print Shop positions graphics and text for greeting cards so you need only fold them as they emerge from the printer.

hi-res graphics screen created with the graphics programs. It includes a kaleidoscope generator that can be used to create unique and interesting backgrounds for your artwork.

Printing, too, is a simple matter of making menu selections, although the actual printing process can be quite slow. It can take several minutes to print a single page, but when it takes only a few minutes to create the item to be printed in the first place, you can hardly quibble about time lost during printing.

Since we had a preliminary copy of the program, we did not have the final documentation, but it is safe to say that no matter how good or how bad it may be, it will be superfluous. The program is completely self-documenting; if you can turn your Apple on, you can turn it into a print shop.

Included in the final package will be samples of brightly colored pin feed paper

If you can turn your Apple on, you can turn it into a print shop.

and matching envelopes that can be purchased from independent suppliers.

The Print Shop is one of the most

SOFTWARE PROFILE

Name: The Print Shop

Authors: David Balsam and Martin Kahn

Type: Graphics

System: Apple II

Format: Disk

Summary: Useful, fun to use program for making signs, greeting cards, banners, etc.

Price: \$49.95

Manufacturer:

Broderbund Software

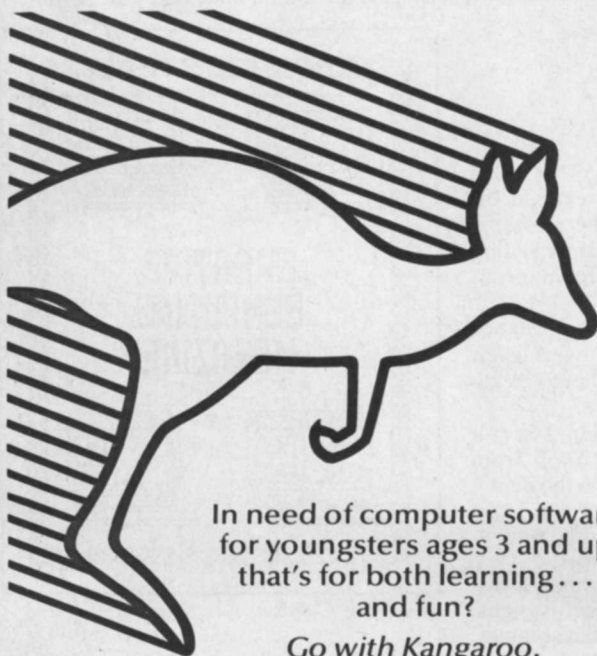
17 Paul Dr.

San Rafael, CA 94903

(415) 479-1170

unusual and useful programs I have seen in a long time. It is the epitome of user-friendliness and should go a long way toward lessening the envy that Apple II owners may feel toward their Mac-owning friends.

CIRCLE 404 ON READER SERVICE CARD



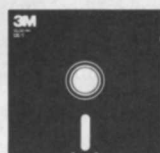
In need of computer software for youngsters ages 3 and up that's for both learning... and fun?

Go with Kangaroo.

KANGAROO™

Kangaroo, Inc., 332 S. Michigan Ave., Suite 700, Chicago, IL 60604 (312) 987-9050

CIRCLE 138 ON READER SERVICE CARD



Precision Data Products

P.O. Box 8332

Grand Rapids, MI 49508-0332

Outside U.S.A. (616) 452-3457

Michigan 1-800-632-2468

Outside Michigan 1-800-258-0028

TELEX 226353 CAMPINS WOLV

3M Brand Diskettes @ Our Prices + Toll-Free Ordering = Error Free Performance



Precision Data's Prices



Unlimited Warranty on All 3M Diskettes

3M 8" Diskette	Per Diskette (Orders of 50 or more)
Single Sided - Single Density - Soft or Hard Sector	
SS - SD Storage Box	\$1.94
SS - SD Bulk with Envelope No 3M Logo	\$1.69
Single Sided - Double Density - Soft or Hard Sector	
SS - DD Storage Box	\$2.49
Double Sided - Double Density - Soft or 32 Hard Sector	
DS - DD Storage Box	\$2.79
3M 5 1/4" Diskette	
Single Sided - Double Density - Soft or Hard Sector	
SS - DD - RH Storage Box	\$1.84
SS - DD - RH Bulk with Envelope No 3M Logo	\$1.65
SS - DD - 96 TPI - RH Storage Box	\$2.49
Double Sided - Double Density - Soft or Hard Sector	
DS - DD - RH Storage Box	\$2.39
DS - DD - RH Bulk with Envelope No 3M Logo	\$1.99
DS - DD - 96 TPI - RH Storage Box	\$3.19
Apple Fileware Compatible	\$4.24
DEC RX 50 Compatible	\$2.89
3M Certified Data Cartridges	
DC 100A	\$13.35
DC 300XL	\$20.65

COMPLETE LINE OF 3M DATA RECORDING PRODUCTS

Shipping & Handling \$3.00/50 Diskettes Surcharge of 10% for quantities less than 50 Diskettes
MI Residents, add 4% Sales Tax

CIRCLE 159 ON READER SERVICE CARD



Presenting a marvelous case for packing-up all your accounting software cares and woes.

Attache Accounting Software has been flawlessly designed to provide you with effective financial solutions.

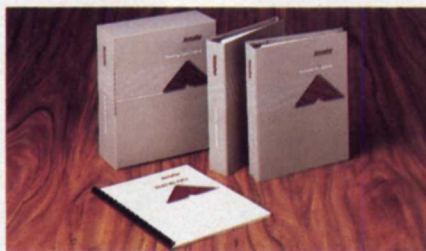
Thoroughly Tested

Developed for small to large companies, Attache Accounting Software has been extensively tested in the United States and Australia and is acknowledged to be bullet-proof. Yet, for all its power and versatility, it is easy to install and easy to use.

Programmed For Growth

Amazingly flexible, it is sensibly designed with "turn-on/turn-off" options to help meet your company's expanding needs.

Attache modules can be purchased separately or as an integrated system. Modules include: Accounts Receivable, Invoicing/



Sales Analysis, Inventory, Accounts Payable, General Ledger, and Payroll.

Software To Go

Everything you require to run your accounting system is packaged inside our attractive Attache Case.

CPA Support

Recognized by leading microcomputer manufacturers as

the ultimate in accounting software, Attache has also earned the recommendation and support of major CPA firms.

End User Training

"Hands-on" instruction is available from a nationwide network of community colleges.

For more details, visit your nearest Attache Software dealer or write: Attache Software Inc., 4251 Plymouth Road, Ann Arbor, Michigan 48105. (313) 663-1166.



Attache

Attache Software Inc.

Accounting software that carries you far into the future.

CIRCLE 112 ON READER SERVICE CARD



Pick a Winner!

The Rainbow gives you good looks, an award-winning design, and a whole lot more. More of what you need in a personal computer.

Best of Show — Two Years in a Row

Winner of the 1983 and 1984 International Design Award* for craftsmanship and engineering—the monitor tilts, the screen is anti-glare, and the keyboard is sleek, detachable, and intelligently arranged—so you work more easily, more productively.

More Power

With the Rainbow you get more power (memory and storage) standard than most other personal computers. It's ready to start working for you as soon as you plug it in.

Pick Your Rainbow

Choose from three compatible Rainbow models. They run more than 1,300 popular software packages on any of five industry-standard operating systems.

You can tailor your Rainbow for your particular business applications.

The Rainbow Spans Your Business Needs

You can start small and work up to more memory, more storage capacity, and more computing power as your needs grow and you begin to use more complex applications.

With the powerful floppy-based Rainbow

100B you can expand memory up to 896KB. Plenty of power for complex databases and large spreadsheets!

With the 100B's standard dual-disk drives you can store the equivalent of 400 typewritten pages without switching floppies. And you can double its floppy storage capacity, if you wish.

Need still more? Get the Rainbow with the 5 Megabyte hard disk, the lowest priced hard-disk system in the industry. It stores up to 2,500 typewritten pages of words or data, more than enough for most small businesses.

And there's more. The Rainbow 100+ with its 10 Megabyte hard disk. It stores up to 5,000 typewritten pages.

The Rainbow Gives You More

Color. It dazzles you with up to 16 brilliant colors. You select them from a palette of 4,096.

Clarity. Its high-resolution bit-mapped-graphics monitor gives you sharp reading, even when you display your spreadsheet over 132 columns.

Keyboard. It looks great and feels great. With its 105 keys laid out in four logical groups, you can breeze through reams of words or stacks of numbers.

Convenience. You can stand Rainbow's versatile system box on the floor and save valuable desk space.

Confidence. The Rainbow is covered by the industry's most comprehensive buyer protection plan** featuring one-year on-site service, and a "Hotline" Advisory Service, at no extra cost.

Compare the Rainbow with any other personal computer. Once you try it you'll pick...The Winner.

To see a Rainbow at a location near you, call
1-800-DIGITAL, Ext. 150.

*1983 and 1984 iF "Good Industrial Design" award, Hanover Fair, W. Germany.

**Limited Warranty.

digital™
DIGITAL EQUIPMENT CORPORATION

Please send me more information on the Rainbow quality leader.

Name _____

Position _____

Org. _____

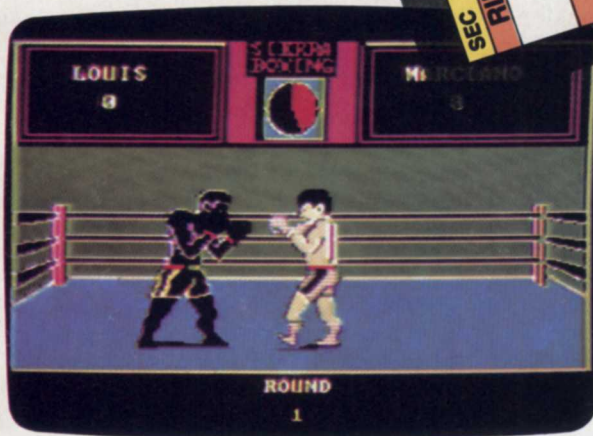
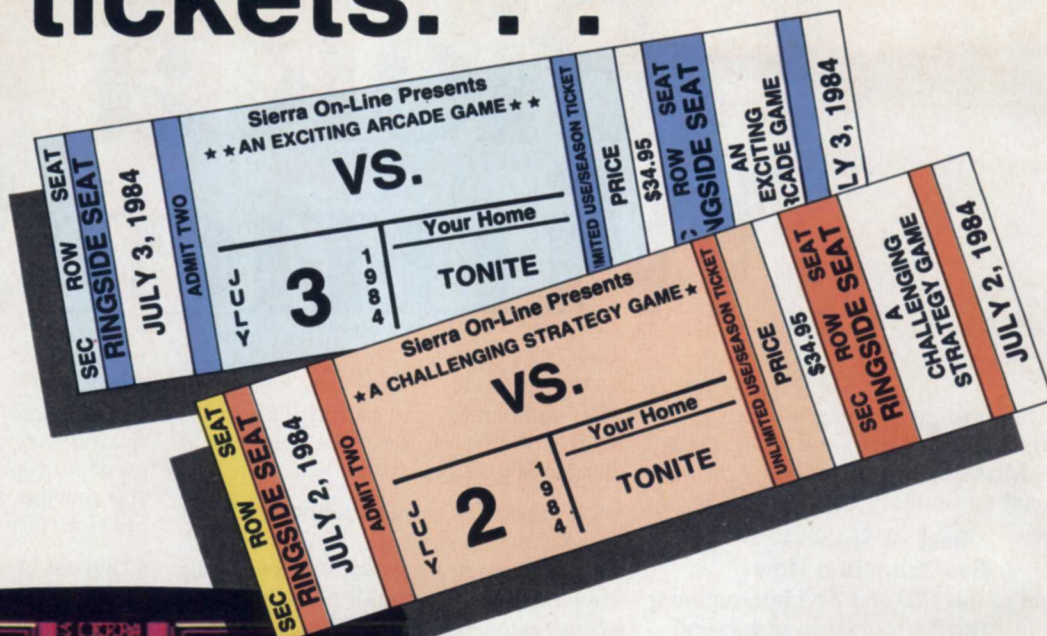
Address _____

_____ Zip _____

Mail to:
Digital Equipment Corporation
Att: Rainbow Information Manager
200 Baker Avenue, Concord, MA 01742



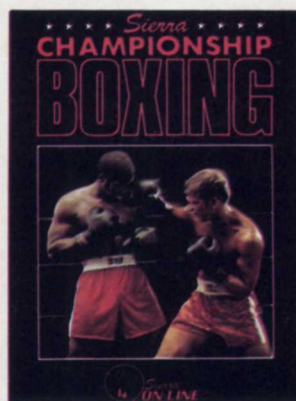
Your tickets. . .



to the
fight YOU
want to see.

A challenging Strategy game

Manage your choice of fifty-three world famous boxers! History's Heavyweight Champions, today's Contenders, plus popular fighters from other weight divisions, all captured for your entertainment. Stage rematches of great boxing matches, or pair up boxers who have never met before. Match your strategic skills against the computer or another player! Manage fighters at the peak of their abilities, or change their statistics to reflect other points in their careers. You can even build your own boxers!



An exciting Arcade game

When you want to do more than manage, get into the ring yourself. You control your fighter's jab, hook and uppercut, his feints and footwork. The Sierra Boxing Clinic coaches you in tricky moves and advanced combinations until you know as much about the sport as almost anyone. Read the History of Boxing for information on your opponent's strengths and weaknesses. Match your moves against the computer or another player in the best arcade action of any strategy game yet!



SIERRA CHAMPIONSHIP BOXING™
available on

APPLE • ATARI • COM 64 • IBM PC • IBM PCjr

TM designates trademark of Sierra On-Line, Inc. © 1984 Sierra On-Line, Inc.

CIRCLE 171 ON READER SERVICE CARD

Look for special promotions wherever you see this display!



Business Graphics for Home Computers

B/Graph



**SOFTWARE
EVALUATION**

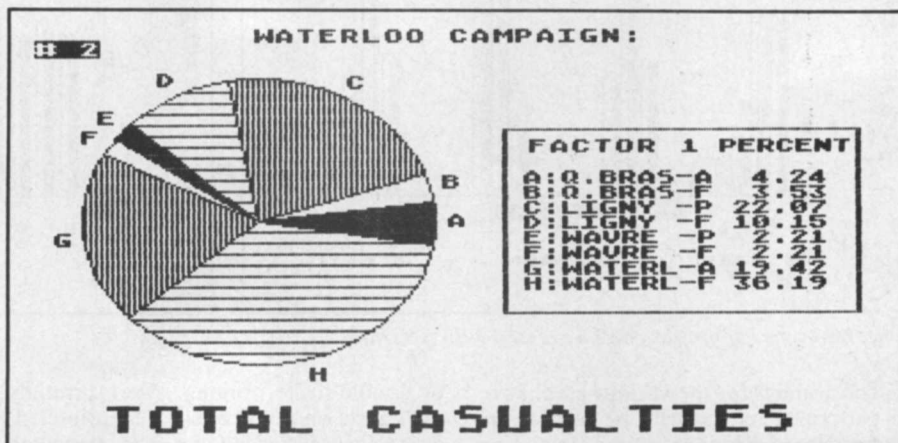
Arthur Leyenberger

Apple and IBM owners are not the only ones who can create sophisticated business graphics with their computers. With the introduction of *B/Graph*, Atari and Commodore users (as well as Apple users) can easily produce bar, scatter, and pie charts. In addition to creating numerous types of graphs and charts, you can also use the analytical tools in the package for the statistical evaluation of data. Analyses such as regression, T-Test, F-Test, Chi-Square Test, and a variety of distribution functions can be performed.

If statistical functions and graphics charting were all that *B/Graph* offered, it would be a tremendous value. But there is more. Included in the excellent manual is one of the best plain-language brief tutorials on statistics I have ever seen. The information presented stresses the practical uses of the various tests and routines, so you do not have to be a statistician to use them. If I had only had access to material like this in my college Stat classes.

Also included are several appendices discussing such topics as artifacting, disk file descriptions, and even a step by step guide to photographing your video screen. All of the information is accurate and much appreciated.

B/Graph is so easy to use, I created a pie chart within 10 minutes of opening the package without referring to the manual. The program uses a combination of menus and single-key commands to



create the graphs and manipulate the data. The graphs are displayed in four-color high-resolution mode using artifacting to produce crisp detail and sharp color.

The program walks you through the creation of the graph. First you select the type of graph you want. Then you choose labels and enter the data. The graph is automatically drawn. Data can easily be changed using familiar editing commands, and the graph is instantly redrawn with changes incorporated. If at any time you decide that the type of graph currently displayed is not the most appropriate for your data, you can easily switch to another type without losing your data or having to retype it. *B/Graph* will even read *VisiCalc* DIF format files, so you can pull in data from your spreadsheet files for plotting.

You can dump your graph or data to your printer whenever you wish. Printing is as simple as pressing the START key on the Atari. You choose what you want to print (graph or data) by toggling between the two screens with the SELECT key. What you see is what you get. *B/Graph* supports the following printers: Centronics,

Epson with Grafrax, C. Itoh, N.E.C., Okidata 92, Gemini, and Seikosha AT/100.

SOFTWARE PROFILE

Name: B/Graph

Type: Graphics charting and statistical analysis program

System: 48K Atari, Commodore 64, Apple

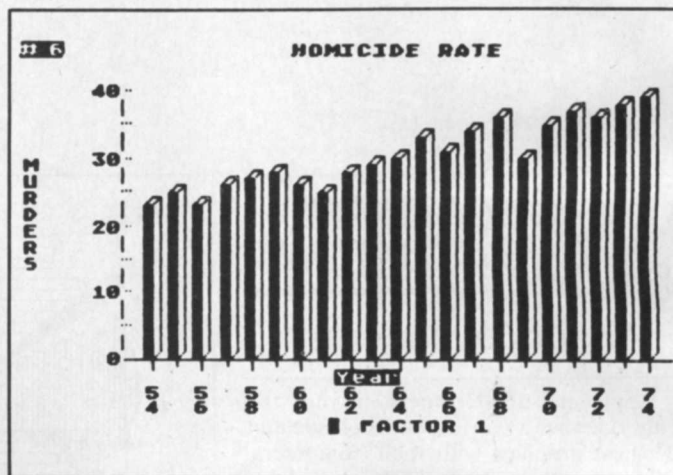
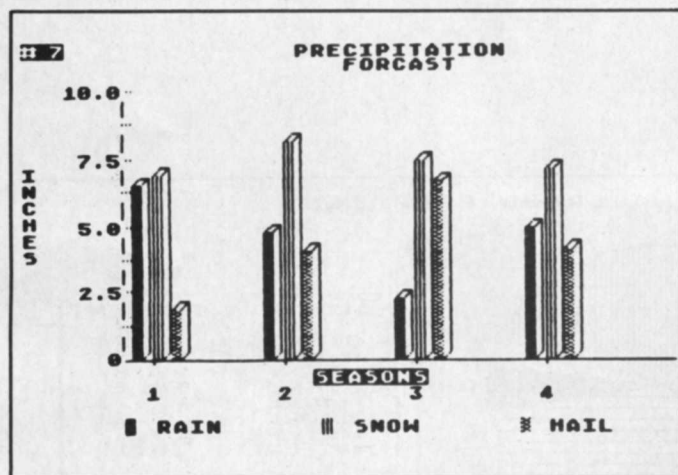
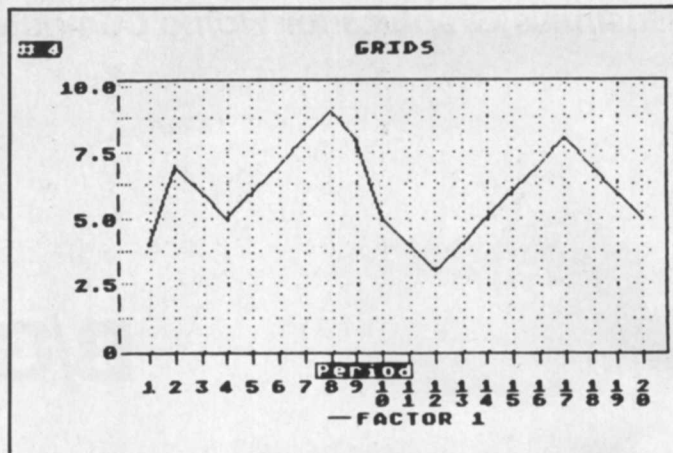
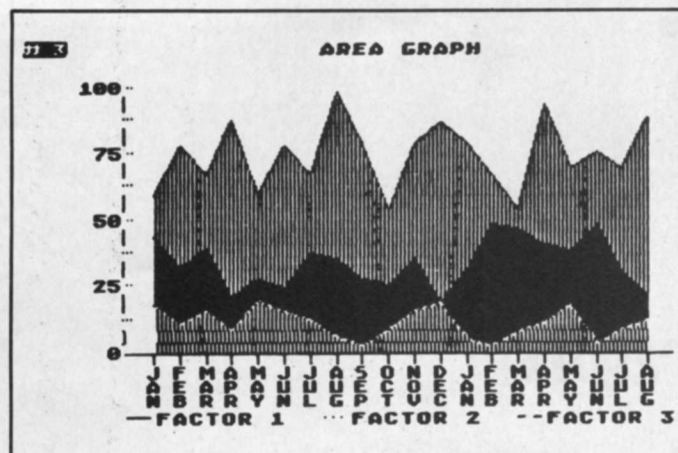
Format: Disk

Summary: An excellent business graphics program. One of the best Atari software values.

Price: \$99.95

Manufacturer:

Commodore Business Machines
1200 Wilson Dr.
West Chester, PA 19380
(215) 431-9100



Different types of graphs can be created with B/Graph.

The scalings for the various graphs are all performed automatically by the program but can be overridden at any time. You can enhance the look of your graphs by filling in under or between lines on a line graph; adding or removing grids, borders, and labels; and changing the intensity or hue. You can even overlay one graph onto another.

B/Graph can either save your data as data files or save the graphs themselves as binary picture files. These picture files may be used with the Imaging function of the program which allows you to set up a slide show and present your graphs in sequence.

During your graphing session with B/Graph, the most commonly used DOS functions are readily available. You can get directory listings, lock and unlock files, rename and delete files, and even format a disk. Having these DOS functions right at hand is a convenient and thoughtful addition to the product.

On the right side of the B/Graph balance sheet are ease of use, comprehensive set of features, and thorough documentation. On the left side are a few minor annoyances. Printer codes cannot be passed to your printer for such things as enhanced

or double-strike printing. When printing pie charts on my Epson FX-80 printer, I get footballs instead of pies. The horizontal axis is longer than the vertical axis due to the better horizontal resolution of the printer. Other printers supported by the package, however, do not exhibit this anomaly.

There are two aspects of the documentation that initially got my dander up. One is the page numbering. It is not sequential from the beginning of the book but, rather, is sequential within each chapter. It is confusing to flip back and forth between sections. The other severe deficit in the manual is the lack of an index. Fortunately, B/Graph is so easy to use, I rarely needed to look anything up. I also understand that both of these problems have been remedied in a new manual.

Since January 1984, B/Graph is no longer sold by In-Home Software. Commodore has purchased the rights to distribute and market the product for the Commodore 64, Apple, and Atari computers. Commodore will sell an entirely new version of the program with new documentation.

By the time you read this, an enhance-

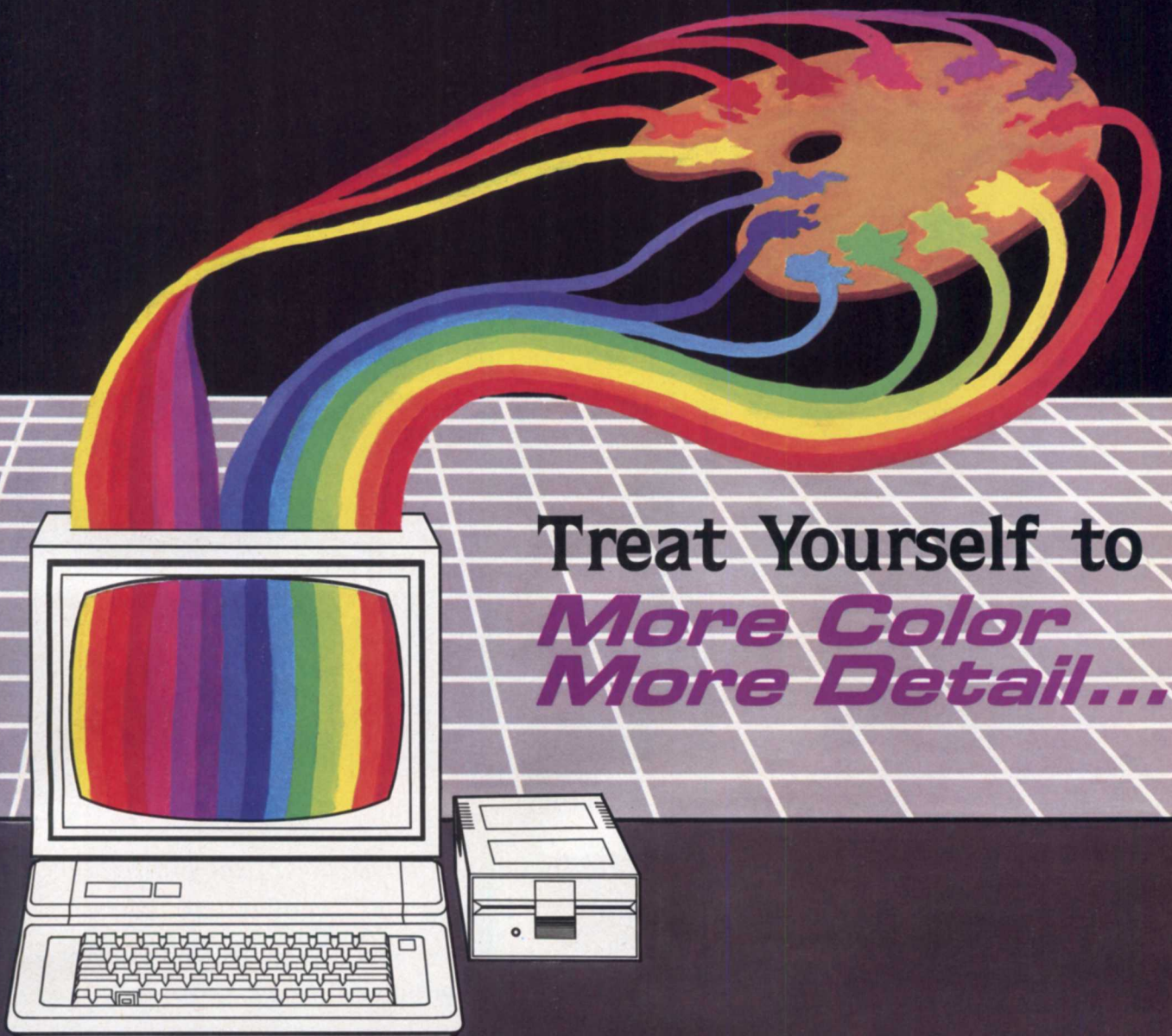
ment disk should be available to all registered owners of B/Graph. This will provide plotter support to the program. Inexpensive plotters such as the Mannesman Tally Pixie, the Sweet Pea, and the Atari 1020 color printer will all work.

Additional plotting functions will also be supplied. Horizontal bar charts, opposed bar charts, bubble charts, and full x-y plotting will be available. Two new statistical functions—analysis of variance and full multiple regression with six independent levels—round out the enhancement disk.

B/Graph is a powerful graphics charting program that allows you to enter data, perform an assortment of statistical manipulations, and make several types of useful and informative charts and graphs. One of the best features of the package is its interactive nature. Being able to perform a statistical test and then immediately display the results graphically really aids comprehension.

B/Graph is extremely easy to use, has an excellent reference manual, and represents an outstanding value. Michael Reichmann, Robert Wilson, and Ian Chadwick deserve a round of applause.

CIRCLE 405 ON READER SERVICE CARD



Treat Yourself to
More Color
More Detail...

Treat Your Apple //e to **HGR6**

Imagine — hi-res graphics with 16 colors. 560 x 192 dots. Your Apple //e with Extended 80-Column Card has the capability. Now HGR6 makes it easy to use by adding new HGR, GR, and HCOLOR functions directly to Applesoft. Change your current programs for 16 colors — or create new ones with twice the detail!

HGR6 lets you easily save double-res images, too. And "compress" them to take less disk

space. Viewing both regular and double hi-res images is a snap with the slide show program included.

HGR6 is a real treat at only \$49.95. Want more color and detail? Get HGR6 today!

Available at your local computer dealer or direct from ALF. Includes both DOS 3.3 and ProDOS versions. Apple is a trademark of Apple Computer Inc.

ALF

ALF Products Inc. 1315F Nelson St. Denver, CO 80215 (303) 234-0871 Telex: 4991824

New.

Sentinel Color Diskettes.



Introducing a practical new time-saving approach to help you organize data storage. Classify information by diskette color: for example, receivables in *green*, payables in *red*, inventory in *blue*, purchasing in *orange*, and so on...

Each Sentinel Color Diskette has a lifetime guarantee; 100% certified at levels which meet or exceed all criteria necessary for accurate, error-free read/write operations.

Phone toll-free for the name of the dealer nearest you:
1-800-323-5005 (in Massachusetts 1-800-323-5001).

Sentinel

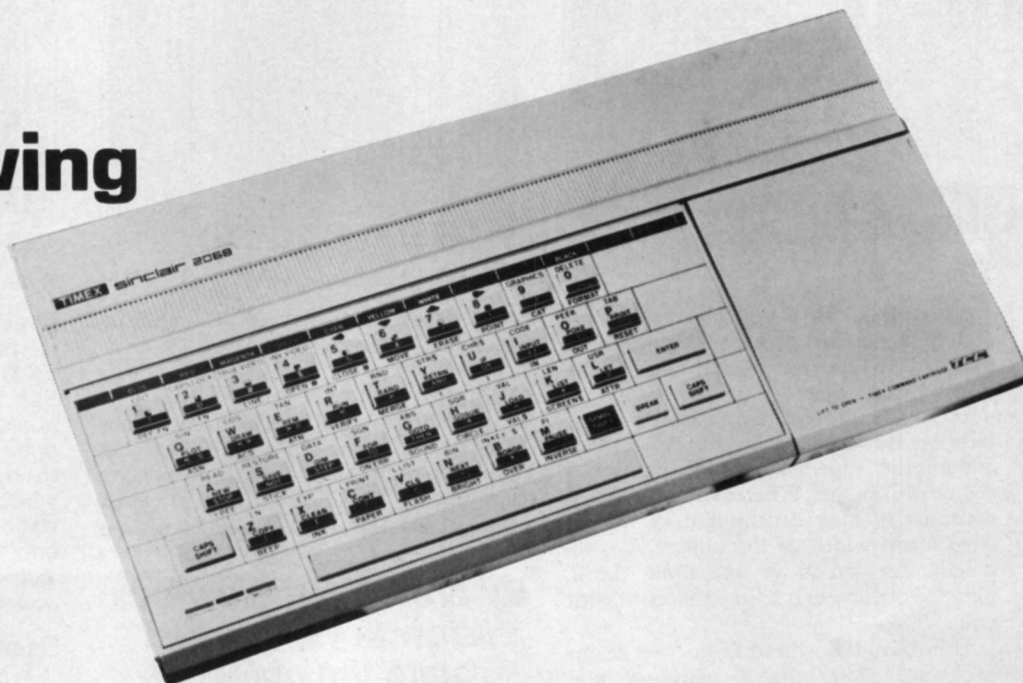
TECHNOLOGIES

One Sentinel Plaza, Hyannis, MA 02601.

CIRCLE 170 ON READER SERVICE CARD

VU-3D for the TS2068

Back To The Drawing Board



For many in the computer world, the name Timex conjures up images of a tiny, black "toy." Timex Computer Corporation now has a larger, more expensive machine, the TS2068, and they are convinced that it is a powerful home computer. After experimenting with the hi-res graphics capabilities of *VU-3D*, a new cassette-based program for the TS2068, I must agree.

While not advertised as such, *VU-3D* can be thought of as a poor man's CAD (Computer Aided Design) package which allows the user to design, display, and print sophisticated three-dimensional "objects." Supplied on an



**SOFTWARE
EVALUATION**

Owen Linzmayer

from tape or begin to create your own figure. Unless you want to recall an item previously saved to cassette, you must choose the latter, which brings you to the "drawing board."

The drawing board is where all of the cut and paste work is done. Your workspace is set up on a cartesian coordinate grid with the origin (0,0) located in the lower lefthand corner. Above the drawing board is a thin banner in which the current commands are displayed, and at the bottom of the screen is a dynamic status line with such information as the cursor position. After leafing through the sketchy seven-page pamphlet that is supplied with *VU-3D*, you are adequately prepared to "build" your first object.

Building An Object

Let's say, for example, that you want to create a rectangular box. Start off by pressing O to open the file which will contain your finished figure. A set of crosshairs pops up at the center of the screen. This is the cursor that you move around the screen using the arrow keys (5-8). After positioning the cursor where

you wish to begin the base of the box, designate the starting point of the figure by pressing S.

The only thing currently on the drawing board is a single glowing point—not much to speak of yet. Slide the cursor over to the right and draw a line to that point. Move the cursor down again and draw another line. Once again to the left, and you have already drawn three sides of the box. To complete the base of the box, type E for end. This draws a line from the current position to the original starting point.

The rectangle displayed on the screen is the footprint of the object you are

**While many software
packages are touted
as being user-friendly,
VU-3D honestly is.**

autostart cassette, *VU-3D* was written by Psion Software and is being marketed in the U.S. by Games to Learn By.

While many software packages are touted as being user-friendly, *VU-3D* honestly is—you are never more than a key-stroke or two away from a helpful menu in *VU-3D*, and a list of available commands is always present on the screen. Your first option, after loading the main program, is to enter a data file

SOFTWARE PROFILE

Name: VU-3D

Type: Poor man's CAD package

System: Timex/Sinclair 2068

Format: Cassette

Language: Assembly

Summary: A showcase of programming talent and computer capability.

Price: \$16

Manufacturer:

Games to Learn By
P.O. Box 575
Williamsburg, MA 01096
(413) 268-7505

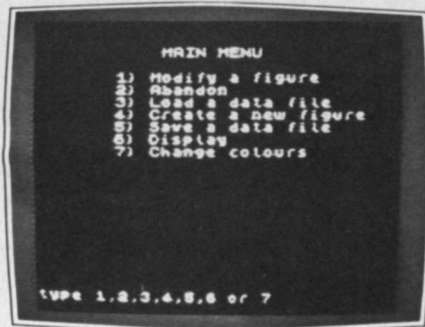


Figure 1. Menu.

creating. That is, if you place the completed figure on a dusty desktop, the footprint is the impression left in the dust by that object.

If you want, you can reposition the base on the drawing board, or you can add another dimension by moving out to the next Z plane. Whereas the X and Y coordinates may be thought of as the length and width of the object, Z is its height. As you move out along the Z plane, you are extruding the box with you.

Unfortunately, there is no way to go backward along the Z plane—if you want to make changes, you must select the modify option from the main menu. When you decide that the box has been stretched out to the appropriate height, you may complete it with either an open or closed top, depending on whether you want to build a box or a block. You are now ready to go to the main menu by quitting.

The main menu has seven items (see Figure 1), but all you want to do right now is to see what you have made. The display option allows you to do just that. By pressing the various arrow keys, you can rotate the object in any direction. This in itself is a truly impressive feature. When the rotate keys are used in conjunction with the commands that let you magnify, reduce, and move the figure, you can view your creation from any angle, any distance, any perspective. At this point, your figure is only a set of connecting lines drawn by the computer. To make your object jump off the screen



Figure 2. Workspace.

in an amazing display of 3-D realism, enter the picture mode.

Adding 3-D

In the finishing stage, the tremendous capabilities of the *VU-3D* package become apparent. One option is to remove the hidden lines from your drawing,

By pressing the various arrow keys, you can rotate the object in any direction.

those that the viewer normally could not see from his particular vantage point (see p. 189, Feb. '84 for an excellent tutorial on hidden lines). Once done, you can go one step further and shade the figure by choosing the direction from which the light source will strike the object. This function can be repeated using different inputs until the desired effect is achieved. One shortcoming of this feature is that even if there is more than one object displayed on the screen at a time, the objects do not throw shadows on each other as you would expect them to in reality.

Up until this point, the figure exists within the memory of the computer as a complex string of zeros and ones; if the machine is turned off, your object disappears. To save your creation for

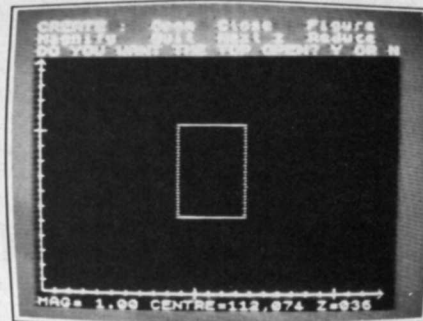


Figure 3. Footprint.

posterity, you may print out a hardcopy if you have a printer connected to the TS2068, or you may keep it on tape. Unlike the save command that can be accessed through the main menu, this option saves the current picture screen to tape, not the original figure from which the picture was created. This static screendump can be loaded back into the computer via a Basic command and used by programs of your own design.

Summary

While *VU-3D* is extremely flexible and easy to use, it isn't without its shortcomings. For one thing, there is no easy way to draw ovals, much less circles. For another, instead of using a "repeat figure" command, you must painstakingly replicate each figure if you want similar objects on the screen at the same time. Finally, when the objects number more than a few, or become too complex, the rotate command is a little bit slow. This is more of a gripe than a valid complaint—after all, how much can one expect of a \$200 computer anyway?

Make no mistake about it, *VU-3D* is a program that struts the stuff of the TS2068. Aside from the hours of fun you can have simply dreaming up exotic shapes and figures, *VU-3D* proves an invaluable tool for budding artists and geometry students as well as those involved in mechanical drawing pursuits. I strongly recommend *VU-3D*; the right hemisphere of your brain will thank you.

CIRCLE 406 ON READER SERVICE CARD

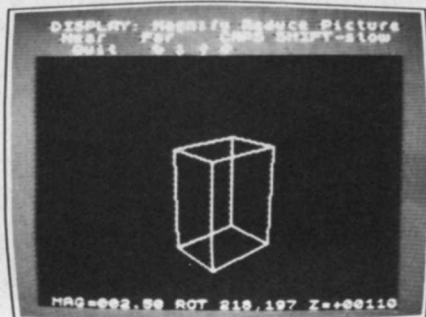


Figure 4. 3-D Perspective.

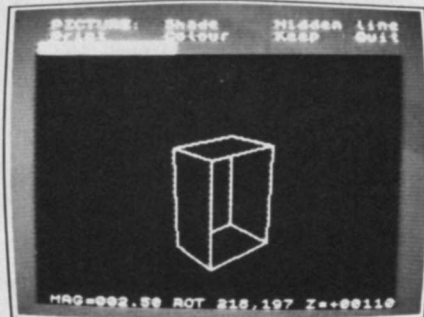


Figure 5. Hidden line removal.

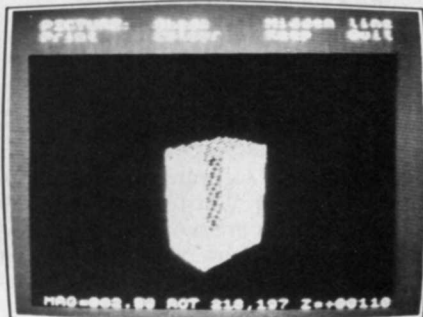


Figure 6. Color shading.

C A T A L O G

EDUCATIONAL, ENTERTAINMENT AND ENRICHMENT SOFTWARE FOR
YOUR APPLE®, ATARI®, COMMODORE™ AND IBM® PERSONAL COMPUTERS

Making You The Best

CBS
SOFTWARE

P

PRESCHOOL TIME

The best way to begin. Programs to stimulate curiosity and discovery.



F

FUN AND LEARNING TIME

The best way to grow. Programs to open up new horizons and expand old ones.





SCHOOL TIME

The best way to do better. Programs developed by leading educators.



LEISURE TIME

The best way to play. Programs to challenge and tickle the mind.



CAREER TIME

The best way to succeed. Programs for personal improvement and development.



SESAME STREET and the Sesame Street Sign are trademarks and service marks of Children's Television Workshop. *BIG BIRD, LITTLE BIRD and ERNIE are trademarks of Muppets, Inc. JAZZ SCATS is a trademark of The Dovetail Group, Inc. NEOSOFT is a trademark of Neosoft, Inc. THOUGHTWARE is a registered trademark of the Institute for Management Improvement. Apple®, Atari® and IBM® are registered trademarks of Apple Computer, Inc., Atari, Inc. and International Business Machines Corp., respectively. Commodore 64™ is a trademark of Commodore Electronics Ltd. Product availability and specifications subject to change at any time at sole discretion of CBS Software.



ERNIE'S MAGIC SHAPES™

A shape and color matching game where children help their Sesame Street friend ERNIE match shapes in six different ways! Developed by Children's Television Workshop, ERNIE'S MAGIC SHAPES gives children practice in visual discrimination—an important early learning skill. Children match shapes and colors while the delightful antics of ERNIE'S magic bunny provide reinforcement and encouragement. The manual includes activities that blend fun and learning. For ages 3 to 6.

AVAILABILITY: COMMODORE 64, IBM-PCjr, ATARI

©1984 Children's Computer Workshop, Inc. All Rights Reserved.

ERNIE ©1984 Muppets, Inc.

*Trademark of CCW, Inc.

BIG BIRD'S SPECIAL DELIVERY™

An object recognition and classification game developed by Children's Television Workshop. Children help BIG BIRD and LITTLE BIRD sort mail and deliver packages on Sesame Street. BIG BIRD'S SPECIAL DELIVERY helps children improve their understanding of form, class and function—while having fun! Children feel right at home with their Muppet friends, and the manual is easy to read and includes family activities. For ages 3 to 6.

AVAILABILITY: COMMODORE 64, IBM-PCjr, ATARI

©1984 Children's Computer Workshop, Inc. All Rights Reserved.

BIG BIRD and LITTLE BIRD ©1984 Muppets, Inc.

*Trademark of CCW, Inc.

DUCKS AHOY!™

Developed by Joyce Hakansson Associates, Ducks Ahoy is a discovery game of planning and surprise. Children practice counting skills and predicting outcomes, and are encouraged to think logically while they keep dizzy ducks afloat and avoid the boat-dunking Hippo! Music and lively graphics entertain as they help to develop preschool skills. Illustrated activity book is filled with ideas for fun and learning. For ages 3 to 6.

AVAILABILITY: COMMODORE 64, ATARI

©1984 Joyce Hakansson Associates, Inc.

SEA HORSE HIDE 'N SEEK™

Developed by Joyce Hakansson Associates, Sea Horse Hide 'N Seek is a game of color and camouflage in a novel environment. Children match colors and develop their understanding of size relationships, while they help sea horses change color to hide from lagoon-fish and get home! Illustrated Hide Guide shows how animals use camouflage in nature. A preschooler's introduction to the computer. For ages 3 to 6.

AVAILABILITY: COMMODORE 64, ATARI

©1984 Joyce Hakansson Associates, Inc.

WEBSTER: THE WORD GAME™

A fast-paced game of fun and learning, Webster: The Word Game encourages children to recognize familiar word forms and gives them a hand with their spelling, too! But Webster: The Word Game is not just for kids; seven degrees of speed and word complexity make it a real challenge for the whole family! Start with three and four letters and progress to six letter words. Hints help when time grows short and "Demon Words" appear to challenge even the best spellers. For ages 7 to Adult.

AVAILABILITY: APPLE II+/IIe, COMMODORE 64, IBM-PCjr, ATARI

©1984 Heuristic Software Corp.

MATH MILEAGE™

Build basic math skills as you race against the clock! A colorful road rally that reinforces basic mathematical facts and concepts as up to four players steer their cars along a fork-filled road to a number goal. Math problems provide the fuel and help develop planning and estimation skills. Night Driving option provides practice in mental arithmetic. Flags and music warn racers against math hazards. For ages 7 to 12.

AVAILABILITY: COMMODORE 64, ATARI

©1984 K-Byte.

MATCH-WITS™

The programmable, educational and entertaining family challenge! Concentration, skill and memory involve players as both creators and participants. Match pairs in six programmed categories to reveal a hidden picture puzzle for bonus points. But that's only half the fun because *Match-Wits lets you program your own categories!* History, family members, science fiction ... whatever! Parents, children and friends can challenge each other in favorite subject areas. For ages 7 to Adult.

AVAILABILITY: APPLE II+/IIe, IBM PC, COMMODORE 64, ATARI

©1983, 1984 Dave Cooper.

PEANUT BUTTER PANIC™

In this game of cooperation and strategy from Children's Television Workshop, the secret of success is clear: to catch stars, make peanut butter sandwiches—and win—you must cooperate. Jump for stars to power your sandwich machine, but to catch the highest stars you must work together *and* share the sandwiches you make. The more you eat, the higher you can launch your partner! Teamwork develops naturally, as you plan your jumps to move to higher levels. For ages 7 and up.

AVAILABILITY: COMMODORE 64, IBM-PCjr, ATARI

©1984 Children's Computer Workshop, Inc. All Rights Reserved.
*Trademark of CCW, Inc.





C O C O - N O T E S™

Fun with music from The Dovetail Group. Aided by the Jazz Scats on Coco-Note Isle, you catch notes, create melodies and fish for tunes. Reel in notes and compose millions of melodies, then hear them as often as you want, or compose new ones ... even select accompaniments. In Beat the Clam, use musical know-how to complete a Jazz Scat tune before the note-eating Mr. Cool Clam makes lunch out of your fishing pole! For ages 7 to 12.

AVAILABILITY: COMMODORE 64, ATARI

©1984 The Dovetail Group, Inc. All Rights Reserved.

H A L F T I M E B A T T L I N ' B A N D S™

A challenging test of musical style, speed and strategy by The Dovetail Group! The Jazz Scats cheer as you create marching tunes and outwit your rival! Lead ranks of bandmen onto the field, complete your formation and construct a unique march in the process. At your disposal is an entire bench of goodies to confound your opponent as you race to be first with a finished march. Combines fun, skill and musical awareness. Rahl! For ages 8 to Adult.

AVAILABILITY: COMMODORE 64, ATARI

©1984 The Dovetail Group, Inc. All Rights Reserved.

M O V I E M U S I C A L M A D N E S S™

Lights! Camera! Action! MUSIC! You're the writer, composer, producer and director as you make your own movies, from casting and set design to editing and soundtracking. Make your movies in the city, the jungle, even outer space. Choose from an endless combination of props and sets, and from dozens of themes as you direct your Jazz Scat stars. Developed by The Dovetail Group, it's a unique way to bring your imagination to life in music! For ages 8 to Adult.

AVAILABILITY: COMMODORE 64, ATARI

©1984 The Dovetail Group, Inc. All Rights Reserved.

T I M E B O U N D™

A 2,000 year dash through time and history! Lost in time, Anacron, your hapless assistant, tumbles from one historical event to another and only you can save him. Race through the past and soar into the future in hot pursuit, gaining knowledge in 11 different categories and on 11 skill levels as you go. Only with quick reflexes, fast thinking, and planning ahead, can you rescue Anacron. Developed by Children's Television Workshop, Timebound is an exciting historical exploration. For ages 10 to Adult.

AVAILABILITY: COMMODORE 64, IBM-PCjr., ATARI

©1984 Children's Computer Workshop, Inc. All Rights Reserved.
*Trademark of CCW, Inc.



L I G H T - W A V E S™

This is no ordinary move-around-the-maze game because you create and change the playfield, the rules and what you see on the screen. Energy beams pulse in their own direction as LightRiders glide over them, travelling through the energy field. You control the direction of the beams to guide the LightRiders to their goals. Developed by Children's Television Workshop, Light-Waves lets you have fun exploring spatial relationships, problem-solving, rule-making and planning. For ages 10 to Adult.

AVAILABILITY: COMMODORE 64, ATARI

©1984 Children's Computer Workshop, Inc. All Rights Reserved.
*Trademark of CCW, Inc.

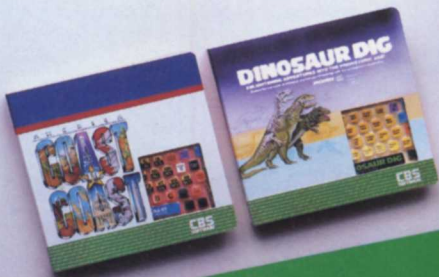
F L E E T F E E T™

From 16 different feet, each with its own characteristics, you choose four to run each race. Use the correct feet and successfully clear obstacles along the escalating 3-D track, in a race that relies more on speed of thought and memory than fast reflexes. Developed by Children's Television Workshop, Fleet Feet provides opportunities to plan, cooperate and solve problems. For ages 10 to Adult.

AVAILABILITY: COMMODORE 64

©1984 Children's Computer Workshop, Inc. All Rights Reserved.
*Trademark of CCW, Inc.





THE ARGOS EXPEDITION

In this space adventure designed by Children's Television Workshop, players interact with each other and the computer, as they cooperate and share information to accomplish their mission. The computer is transformed into a spaceship console that players jointly control. Soaring through space, players take an active role in group decision-making, coordinating inputs to avoid hazards, finding artifacts and returning safely home. Each voyage is a new adventure as players take on different roles and encounter new situations! For ages 10 to Adult.

AVAILABILITY: COMMODORE 64

WEATHER TAMERS™

This is a game that allows you to do more than talk about the weather. You and your fellow weather forecasters create, manipulate and control a computer-simulated weather system. You control the forces of nature, cope with hurricanes and jet streams, use scientific thinking as you cooperate and compete with other players to create and forecast the right weather outcomes for your region of North America. For ages 10 to Adult.

AVAILABILITY: COMMODORE 64

©1984 Children's Computer Workshop, Inc. All Rights Reserved.

*Trademark of CCW, Inc.

THE EASYKEY™ KEYBOARD OVERLAY

Made of durable vinyl, EasyKey fits over the computer keyboard to become the program menu! Quickly select options and answer questions without any computer or typing experience.

AMERICA COAST-TO-COAST™

An exciting activity package featuring colorful, animated graphics and the EasyKey™ Keyboard Overlay. Five interactive geography games of the 50 states: names, capitals, years of statehood, sizes, mottos and selected industries. Program guide aids in learning and provides resources to encourage further investigation into American history. With America Coast-to-Coast, you've got a ticket to every state of the union without ever leaving home! For ages 8 to 14.

AVAILABILITY: APPLE II+/IIe, IBM PC/PCjr, COMMODORE 64

DINOSAUR DIG™

Adventures in the prehistoric age! Explore the lost world of dinosaurs and test your knowledge with exciting learning activities. Complete with EasyKey™ Keyboard Overlay. Begin with an electronic journey back in time to discover these amazing creatures for yourself, to see where they lived and investigate why they died out. Five interactive activities test you and, together with the program guide, encourage further study. With Dinosaur Dig, the lost world of dinosaurs won't stay lost for long! For ages 8 to 14.

AVAILABILITY: APPLE II+/IIe, IBM PC/PCjr, COMMODORE 64

©1984 NeoSoft Incorporated. All Rights Reserved.

MASTERING THE SAT™

Developed in cooperation with the National Association of Secondary School Principals, this comprehensive and self-paced program covers all areas: Verbal, Math and the Test of Standard Written English. Emphasizing the principles involved in each question and solution, as well as test-taking strategies, it includes SAT pre- and post-tests, menu-driven skill development exercises, explanations of answers, and 152-page Test Preparation Workbook. Mastering the SAT offers the practice, information, specific training and confidence students need.

AVAILABILITY: APPLE II+/Ile, IBM PC/PCjr., COMMODORE 64

©1983, 1984 National Association of Secondary School Principals. All Rights Reserved.

MASTERING THE COLLEGE BOARDS:

ENGLISH COMPOSITION™

Comprehensive, self-paced preparation program and review of the fundamentals of standard written English covers the four types of test questions plus error analysis and test-taking strategies. Over 1,000 randomly generated questions offer practice in rewriting sentences, phrasing, editing and identification of grammatical errors, plus pointers on sentence structure. Explanations of answers and diagnostic scoring is included. Teacher developed, this is an effective tool for review and preparation for the ECAT at home.

AVAILABILITY: APPLE II+/Ile, IBM PC/PCjr.

©1982, 1984 Microcomputer Workshops.

SUCCESS WITH MATH™

Comprehensive, self-paced math tutorials for primary and secondary school students in basic skill reinforcement and remedial learning. Like a patient tutor, Success With Math works with students every step of the way. Simple on-screen explanations illustrate step-by-step problem solving. Students are directed to the source of errors before continuing on, and analysis at the end of each program helps monitor overall progress. Problems are generated at random with new ones appearing each time the program is run. Success With Math encourages and prompts the student to successfully arrive at correct answers.

ADDITION AND SUBTRACTION—FOR GRADE LEVELS 1 TO 4

MULTIPLICATION AND DIVISION—FOR GRADE LEVELS 2 TO 8

FRACTIONS: ADDITION AND SUBTRACTION—FOR GRADE LEVELS 5 TO 8

FRACTIONS: MULTIPLICATION AND DIVISION—FOR GRADE LEVELS 5 TO 8

DECIMALS: ADDITIONS AND SUBTRACTION—FOR GRADE LEVELS 5 TO 8

DECIMALS: MULTIPLICATION AND DIVISION—FOR GRADE LEVELS 5 TO 8

LINEAR EQUATIONS—FOR GRADE LEVELS 7 TO 11

QUADRATIC EQUATIONS—FOR GRADE LEVELS 9 TO 12

AVAILABILITY: APPLE II+/Ile, IBM PC/PCjr., COMMODORE 64, ATARI

©1982, 1983, 1984 Microcomputer Workshops.





MANAGING FOR SUCCESS™

Be a better manager with the business- and classroom-tested instruction offered by this comprehensive, innovative series of programs developed by Thoughtware®, leaders in the field of computer-assisted management training. Self-paced and interactive, these programs utilize case studies and simulations of day-to-day situations so you gain practice and experience in managing. For ages 16 to Adult.

PERSONAL DEVELOPMENT

Includes analysis of how managers function, what qualities define a good manager, a step-by-step assessment of your attitudes toward management and managing others, and understanding your strengths and weaknesses as a manager. Emphasis is placed on recognizing your personal preferences as you begin to explore management career options and formulate steps toward realizing your personal development goals.

PEOPLE MANAGEMENT

Through self-paced instruction and case studies, you can become a better and more effective manager of people, in both one-on-one and group situations. Examine leadership styles and strategies, motivating others to achieve results and building and evaluating effective teams for business and personal goals. Major emphasis is placed on an understanding of communication and its practical applications.

AVAILABILITY: APPLE II+/IIe, IBM PC/PCjr.

©1983, 1984 ThoughtWare, Inc.

MICROSPEEDREAD™

Designed to put you back in control of your reading time, making you a more dynamic, flexible and productive reader. MicroSpeedRead approaches speed reading as an information-gathering process. Provides reinforcement, encouragement and feedback through strategies tested with students and professionals in college classrooms and business workshops. Program guide provides learning objectives for each lesson and printed practice selections from current periodicals and literature. With so little time and so much to read, you need MicroSpeedRead. For ages 16 to Adult.

AVAILABILITY: APPLE II+/IIe, IBM PC/PCjr., COMMODORE 64

©1984 Gail Benchener, Rose Wassman and James Lucas.

MYSTERY MASTER: **MURDER BY THE DOZEN™**

Twelve tangled webs of crime and puzzlement put your powers of logic and deduction to the test! Begin with a case profile of each carefully constructed murder and then travel a twisted trail of shady characters, false leads, clever deceptions and red herrings in search of clues. A unique Game Clock ticks on as you interview suspects, search apartments or travel across town. Do you have enough evidence to convict? Only the computer knows! With four player capacity, a separate Solution Book, worksheets and tips for successful investigations, Murder By The Dozen has all the makings of a bloody good time! For ages 10 to Adult.

AVAILABILITY: APPLE II+/Ile, IBM PC/PCjr, COMMODORE 64

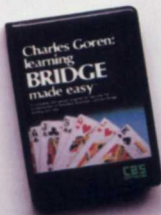
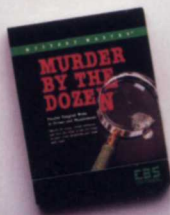
©1983, 1984 BrainBank, Inc.

CHARLES GOREN: **LEARNING BRIDGE MADE EASY™**

Bridge is fun to play, but hard to learn in public. Charles Goren is the answer, a private tutor with endless patience and expert guidance. This bridge learning system provides sections on bidding and "the play of the hand." Quizzes, evaluations and explanations clarify and encourage. Complete with a 144-page Player's Manual. Whether you don't know a trump from a trick or simply want the master's expert advice *at your own pace*, Charles Goren is your ace in the hole! For ages 10 to Adult.


AVAILABILITY: APPLE II+/Ile, IBM PC, COMMODORE 64

©1983, 1984 Goren International, Inc.





CBS Software, A Unit of CBS Inc.
One Fawcett Place, Greenwich, CT 06386 (203 622-2525)
In Canada, Holt, Rinehart & Winston

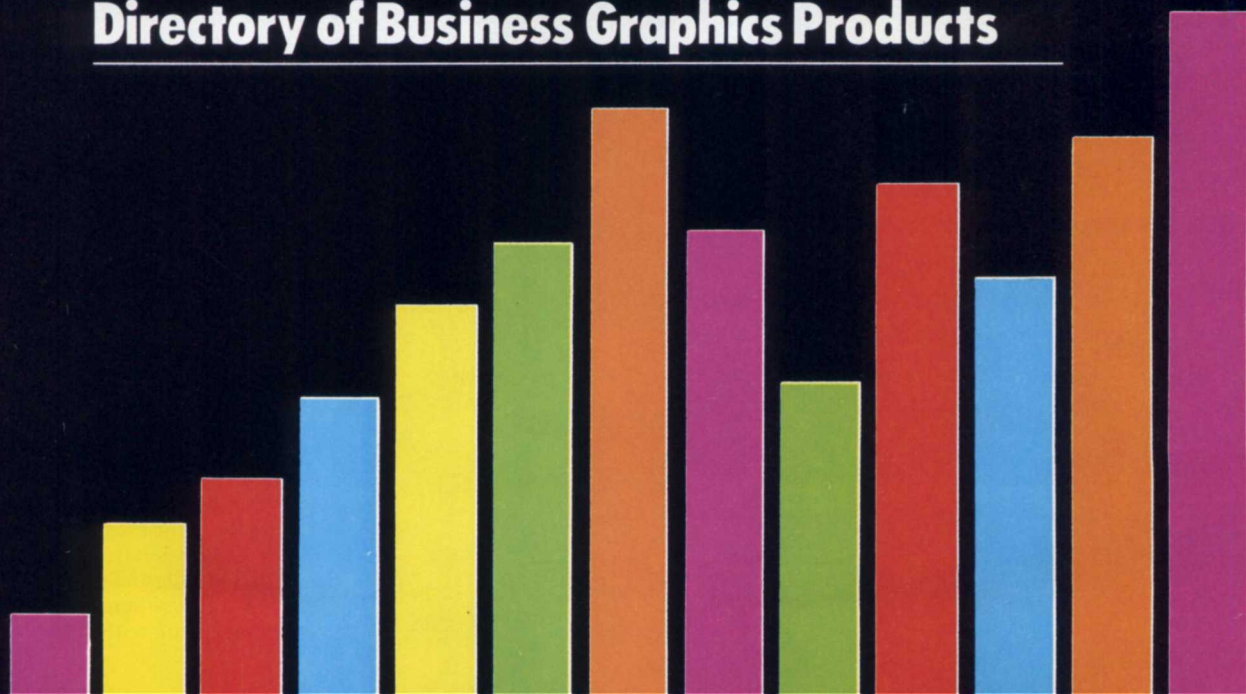
A large, colorful pie chart in the upper left corner, divided into several segments of orange, purple, blue, green, red, and yellow.

CHOOSING USING A BUSINESS GRAPHICS PACKAGE

Basic Types of Business Graphics Software

Business Graphics Software Comparison Chart

Directory of Business Graphics Products



Basic Types of Business Graphics Software

Business Graphics Packages: *These packages automatically produce bar graphs, pie charts, line graphs, etc. from data entered by the user. They normally have no capability to manipulate the data or perform transformations on it (e.g., PFS: Graph, Super Chartman II).*

Statistical/Graphics Packages: *This software has the ability to manipulate and/or transform the data after entry as well as to display the results graphically (e.g., VisiTrend/Plot, Graph N' Calc).*

General Purpose Graphics Software: *Although not necessarily intended only for business use, these packages allow the user to design any type of graphic (not just charts or graphs) and often include special features allowing text screens, three-dimensional graphics, animation, and "cut and paste" routines (e.g., The Complete Graphics System, MacPaint).*

Slide Show Software: *This type of package is the computer equivalent of a 35mm slide projector. The graphics created with other programs are stored and sequenced with slide show software to allow organized presentation and display (e.g., Executive Briefing System, Frame-Up).*

Graphics Dump Programs: *This specialized software allows users to print and/or plot graphics displayed on the monitor screen (e.g., Paper Graphics).*

CHOOSING &

M

ost business presentations you attend (department meetings, sales presentations, annual meetings) are meant to convey some information to those attending; some succeed more than others. These meetings often make use of:

- "Chalk talks" in which one person alternately draws on a board or tablet and talks.
- Slide shows with professionally prepared 35mm color pictures.
- Prepared handouts of either numeric or graphical material.
- Overhead projectors with transparencies.

Most business meetings include graphic tools to get the point across. The reason is simple: graphics convey more information more directly and vividly than any other medium.

A quick look at almost any college textbook, regardless of discipline (economics, sociology, mathematics), reveals numerous illustrations, charts, and graphs. The reason here is also that graphics are a dramatic and informative way to encapsulate large quantities of information. If your business involves transmitting information, you probably should be using graphics to do at least some of the work for you.

While we are interested primarily in business graphics in this section, the programs and techniques mentioned are applicable as well to anyone who teaches, demonstrates, trains, or presents almost anything.

Over the last few years, the variety of graphics software which has become available to microcomputer users has included easy-to-use packages capable of producing presentation quality graphics to communicate many kinds of information. Even so, the potential of the microcomputer is relatively untouched because the computer deals with things mathematically while most people prefer to deal with things visually. The most successful of the new graphics packages we will look at link the mathematical capabilities of the computer with the visual require-

USING A BUSINESS GRAPHICS PACKAGE / BARRY KEATING

ments of the viewer to create a powerful tool for business professionals, teachers, designers, engineers, and others.

Types of Graphics Software

The graphics software available today falls into five main categories:

- Business graphics packages.
- Statistical/graphics packages.
- Freeform or general purpose graphics packages.
- Slide show software.
- Graphics dump programs.

Few of the programs available today fall neatly into only one of the five pigeonholes. Rather, each of these five categories offers different useful possibilities to the business user.

Most of the graphics software marketed directly to business users falls into the first category, business graphics packages. This type of package will represent data as it is most commonly used in business, as bar charts, pie charts, and line graphs. We shall look at examples of each generated by specific programs.

A more powerful group of packages

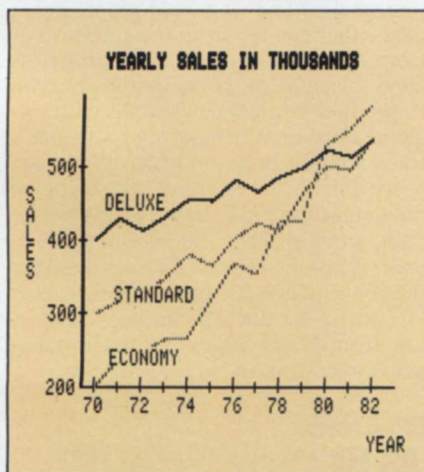


Figure 1. Produced with *VisiTrend/Plot*, this graphic is a plot of three data series on a single screen. The axes are scaled automatically, and the legend and titles can easily be added by the program.

(statistical/graphics packages) not only presents the data in graphic form, but also manipulates raw data to get it into a meaningful format. These programs are able to use regression, trend analysis, exponential smoothing, and other statistical operations; store the results of the calculations; and then present the results in pictorial form. Few packages of this sort exist on mainframe computers; this use of integrated analysis and graphics almost requires the use of a microcomputer. (SPSS and SAS, of course, perform these duties on many corporate mainframes but at great expense while requiring some knowledge of programming).

General purpose graphics software is not marketed to businesspeople in particular, but the power of some of these packages (coupled with their ease of use) makes them very useful for displaying anything *other* than the traditional line, bar, and pie charts.

Slide show software turns your micro into a presentation device. These packages make a microcomputer behave (in some ways) like a slide projector.

Graphics dump programs enable you to get hardcopy (printouts) of whatever you can see on your monitor. If you want to pass your graphics around, keep your eye out for this feature.

Let's stress again that most commercial packages are a combination of two or more of the five types of graphics packages.

Your First Presentation

As you step on the elevator Monday morning your section manager, Alice, reminds you that this Wednesday the management team from "corporate" will be in to review the sales of your three product lines. "Could you supplement your presentation with some graphics?" asks Alice. "We need to convince them that our Economy model is the hot item."

A simple request, but to supplement your facts with a graphics display is going to take some time and effort—how much

time and effort? Any business analysis involves plotting and graphing numerical data. These numbers could be the dollar sales of different product lines or they could be the results of calculations designed to identify trends and tendencies. What it is going to take to produce the graphics is a pencil, paper, a large work-

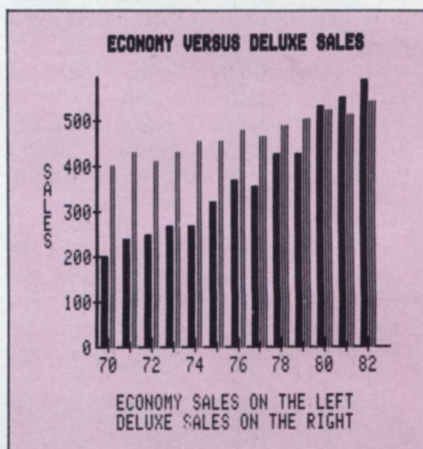


Figure 2. Also produced with *VisiTrend/Plot*, this graphic places two bar charts side-by-side for comparison.

sheet, a calculator, some raw data, and a great deal of time or...

With your personal computer you can organize the data, store it, analyze it, manipulate it to your heart's content, and then finally display it. Doing it this way is actually going to save you an immense amount of time rather than making the process more time consuming than it already is. Let's emphasize, however, that this first time through a computer-generated presentation will be a little slow at times. With the correct software, the final product will be first class, but it will take a little learning time the first time around. Those who have to do this once a month or three or four times a year are bound to save much more time than those who give only one presentation each year.

Let's take Alice's suggestion for a presentation and show the actual results you

Business Graphics

could achieve. While our case will be a simple one, you should get a feel for how your own, more complicated situations could be presented using the same techniques and software. Thirteen years of sales data (from 1970 through 1982) are available for the three product lines (Economy, Standard, and Deluxe) that your company produces, and you would like to present the sales data graphically in a way that will convey some information about the numbers to your audience.

Two of the most widely used programs that could easily handle this situation are *VisiTrend/Plot* (available for the Apple II, III, and IBM PC) and *Lotus 1-2-3* (available for the TI Professional, DEC Rainbow, Wang Professional, Grid Compass, and IBM PC). Figures 1 through 5 were done with *VisiTrend/Plot*; similar figures could also be produced with *Lotus 1-2-3*.

After keying in the sales data, either of these programs will allow you to:

- Save the data to a disk for later use.
- Analyze the data in some fashion (e.g., calculate summary statistics).
- Plot or graph the raw data.
- Plot or graph calculated data.

Both *VisiTrend/Plot* and *Lotus 1-2-3* are combination business graphics and statistical packages. Figure 1 is a concurrent plot of the sales of each of the three products over time. It quite clearly shows that

sales for each of the three are growing over time but that the Economy model appears to be growing in sales much more rapidly than the other two models. The same information (that is, the raw data) was used to produce Figure 2 as well.

Figure 2 highlights the relatively rapid growth in the Economy model when compared to Deluxe sales. A bar chart, like the one in Figure 2, is often more dramatic, especially in color, than the simple line graph of Figure 1. Both *VisiTrend/Plot* and *Lotus 1-2-3* can produce color graphics for screen display, but *Lotus 1-2-3* can also print graphics in up to seven colors, depending on your printer or plotter. *VisiTrend/Plot* is not capable of driving a color plotter. The figures reproduced here, however, were printed on an Epson MX-80 dot matrix printer (no color).

Pie charts, like the one in Figure 3 are often useful for representing a single set of data. Figure 3 shows forecasted 1984 sales shares for each product line.

Often, however, it is necessary to "massage" the data in some fashion, and then display the results. Your company may wish, for instance, to project 1984 Deluxe sales from past sales data. *VisiTrend/Plot* can compute a trend line with a single key command and then display the results as pictured in Figure 4. *Lotus 1-2-3* has some statistical functions built-

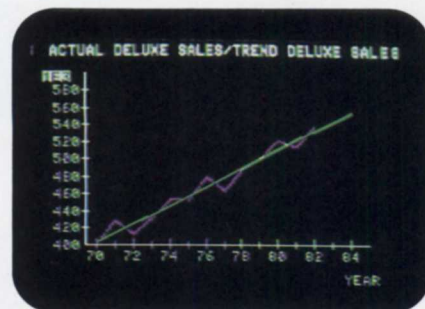


Figure 4. The results of a simple trend analysis are displayed showing the projected sales in 1984. This graphic required two steps to produce with *VisiTrend/Plot*: first, the trend line was computed; second, that trend line and the actual sales through 1982 were plotted.

in (e.g., average and standard deviation), but cannot run regressions or perform trend analysis. *Lotus 1-2-3* does, however, have a built-in spreadsheet program (like *VisiCalc*) and can use data from the spreadsheet for plotting and graphing.

VisiTrend/Plot also has the ability to split the viewscreen into windows for comparison of two graphical pieces of data at one time. Figure 5 shows this feature with the Economy sales trend line at the top of the screen and the Deluxe sales trend line pictured immediately below. Vertical screen splitting is also available in *VisiTrend/Plot*.

Both *Lotus 1-2-3* and *VisiTrend/Plot* are, then, capable of producing line, bar, pie, stacked bar, and X-Y graphs from data either entered from the keyboard or from data files on disk. Both programs allow "what if" graphing by allowing you to produce entirely new graphs with single keystrokes. *VisiTrend/Plot* also has a trend analysis program which allows you to see quickly the results of many types of data relationships such as time series data, stock prices, and production figures. While *VisiTrend/Plot* does not offer the convenience of a built-in spreadsheet as *Lotus 1-2-3* does, it can use information from *VisiCalc* files for further statistical forecasting and graphic display.

PFS:Graph

Many of the same types of graphics produced with *Lotus 1-2-3* and *VisiTrend/Plot* may also be produced with *PFS:Graph*, a business graphics program that is available for the Apple II and III line and the IBM PC. *PFS:Graph* will as-

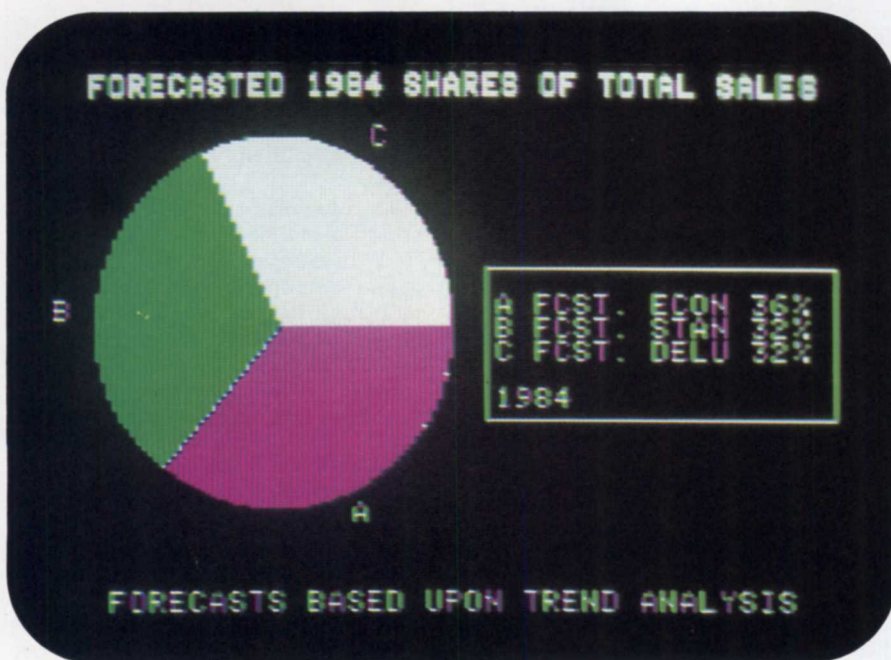


Figure 3. A pie chart produced with *VisiTrend/Plot* also includes a breakdown of the percentages of total as in this figure.

semble charts or graphs in color or black and white. *PFS:Graph* can use information in *VisiCalc* files, information entered from the keyboard, or information from its companion program, *PFS:File*. Up to four graphs may be overlaid on a single set of axes just as in *VisiTrend/Plot*. Mixing line and bar graphs and stack graphs or displaying them side-by-side is also a simple task with *PFS:Graph*. The program will print the graphs to a wide variety of printers and will also drive an HP7470A color plotter.

Graph N' Calc

While *PFS:Graph* is only a business graphics program (and not capable of statistical calculations), *Graph N' Calc* for the IBM PC is a completely integrated system that allows you to enter data in a

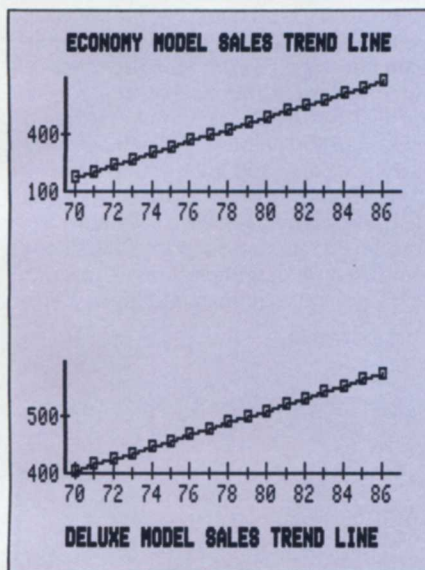


Figure 5. Split screen projection showing two plots at one time using two horizontal windows is also available with *VisiTrend/Plot*.

spreadsheet format, perform complex analysis of the data, prepare color graphs using the data, and save and retrieve the data from external storage in DIF (Data Interchange Format). The use of DIF for files in *Graph N' Calc* means that you may use files created by other programs which also use DIF files, such as *VisiCalc*, *VisiTrend/Plot*, and *I-2-3*.

Graph N' Calc is marketed for serious business forecasting use—that is why the program disk comes with two manuals, one, the standard program manual with a

tutorial section (well done) and the second, a 292-page textbook-like manual on forecasting technique. The forecasting book is not directly keyed to the program and includes quite a bit of information which is not relevant to the program at all while leaving out explanations of some of the more powerful features of *Graph N' Calc*. The program, for instance, can calculate internal rates of return which are often used for project selection and net present values, but the book doesn't mention either technique (the *Calc* section of the program can also use logarithmic transformations, exponential smoothing and polynomial functions).

For display of completed material *Graph N' Calc* can print graphics to either an IBM or Epson printer (a plotter module for the HP 7470A plotter is available for \$100 extra), save graphics to disk, or create a slide show of completed graphics.

Super Chartman II

Super Chartman II for the IBM PC closely resembles *PFS:Graph*. *Super Chartman* is not a statistical package in any sense and has no slide show routine; it is strictly a business graphics package that can read DIF files. It does, however, offer a complete set of 20 different chart types including some with a three-dimensional look. It will drive the HP 7470 plotter, the IBM XY-750 plotter, and the HP 7220 plotter; *Chartman* will also drive many printers.

The manual for *Chartman* is written for first time users and includes step-by-step instructions for many common chart types. One interesting addition to the manual is a set of reproducible "graphics requests forms" to allow people unfamiliar with computers to order charts or graphs by filling out a specially designed form which includes some graphics examples as part of the form.

Text As A Graphics Tool

Text screens are also part of any effective business graphics presentation; they provide the explanation for what the viewer has seen or is about to see. Figures 6 and 7 are examples of screens used for presentations. Figure 7 was produced with *Executive Briefing System* which is available for the Apple II and Apple III. Similar text screens could be produced with a variety of other packages (see comparison chart and Figures 8 and 9).

Graphing and plotting programs can be difficult to use (*VisiTrend/Plot*, *Lotus*

I-2-3, and *PFS:Graph* are notable exceptions) but their output is limited largely to chart format material; to produce text screens and present text screen/graphics combination displays you need a program capable of producing multiple text formats interspersed with graphics, many type fonts, and a variety of colors. In addition, you need a simple method of displaying one screen after another (in slide show fashion) for active presentations.

Executive Briefing System and *The Graphics Department* fit the bill perfectly. Let's assume you have produced the graphics screens in Figures 1 through 6, and now you need some text screens to tie the program together; you also need a method for displaying your work that is foolproof (after all, the worst thing to have happen in a presentation is a breakdown in the equipment). Aimed primarily at business users, *EBS* is a simple program that allows you to transfer the charts and graphs from other programs to *EBS*, add extremely professional text screens, and select among several formats for the presentation of your material. One important note: *PFS:Graph*, much to my dismay, is apparently unable to produce files readable by *EBS* or any other program with which I am familiar. In other words,

THE STRUCTURAL DEFICIT (FISCAL YEARS-BILLIONS OF DOLLARS)			
	1983	1984	1985
BASELINE DEFICIT	179	203	218
LESS: EFFECT OF RECESSION	106	89	76
STRUCTURAL DEFICIT	73	114	142
DEFICITS AS % OF GNP	5.6%	5.8%	5.7%

Figure 6. *Executive Briefing System* text slide.

REVENUES* (% MILLIONS)			
COMPANY	1982	1981	%
Apple	664.8	481.1	65.5
IBM	599.8	N/A	N/A
Tandy	466.2	293.8	59.1
Commodore	367.8	184.4	99.4
HP	235.2	195.0	20.6
TI	233.0	144.3	61.4
DEC	200.0	N/A	N/A

Figure 7. Text slide done with *The Graphics Department* on an Apple.

Business Graphics

PFS:Graph graphics may not be used by *EBS* or any of the other slide show programs mentioned below. This clearly makes *PFS:Graph* acceptable only for business graphics which will be printed or plotted rather than displayed on a monitor or large screen projector system. While *PFS:Graph* is a bit easier to use than *VisiTrend/Plot*, its limitations in transferring the output to other programs is a real liability.

EBS, however, can use material produced by *VisiTrend/Plot* as well as several other graphics packages. Up to 32 slides can be included on a single *EBS* formatted disk. This includes the *EBS* runtime program (the program that controls the display) which may be transferred to any blank disk. Transfer of graphics from other programs is easy—Figure 2, for instance, created with *VisiTrend/Plot* was saved to a disk with the *PIXSAVE* command of *VisiTrend/Plot*. After *EBS* was booted, the figure was called onto the screen with the *GET* command and then saved to an *EBS* slide disk (i.e., a disk with the *EBS* runtime program already written onto it). The entire procedure of creating Figure 2, saving it to a disk, and transferring it to an *EBS* disk took less than ten minutes.

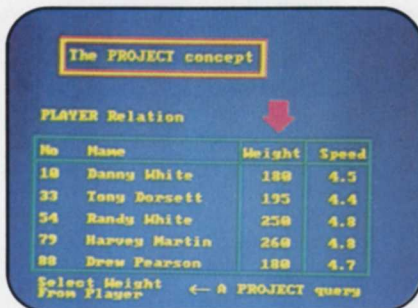


Figure 8. IBM text slide done with Hypergraphics.

Designing text slides with *EBS* is really quite a bit of fun. To create a text slide like Figure 6 you need to specify in *EBS* the type and size of the font in which you wish to compose. The particular font (typestyle) or size you use can be changed at anytime while you are composing the slide as can the color of the text. Figure 6 uses two different fonts, while Figure 9 uses multiple fonts as well as color. Lotus, which produces *EBS*, also sells an extra disk of accessory fonts, many with both upper- and lowercase and even some special characters to improve your presentations.

The Graphics Department

The *Graphics Department* is aptly titled. It is a complete set of graphics utilities for the Apple which is built primarily to do the work you might have previously sent to a graphics department within an organization (including text slides). It is a more integrated package than some of the older material available for the Apple and combines the power of many of the older programs with some new twists which make it an extremely useful tool. It is easy to use, too.

What "standard" techniques can you apply with *The Graphics Department*? It is first and foremost a tool for entering, saving, and displaying business data in a variety of formats. Data can be entered from the keyboard or read in from a DIF file (this makes it compatible with data files used by *VisiTrend/Plot*, *VisiCalc*, and many other programs that use DIF data files). Once the data are in place, you can choose any of the familiar bar, line, pie, or scatter formats for display. Grids can be overlaid, and multiple plots can be displayed on a single chart.

Trend analysis, the most common statistical forecasting technique, is handled by *The Graphics Department* as you are given the opportunity to plot additional statistics on any given chart (see Figure 10). These optional statistics include: the mean value, the standard de-

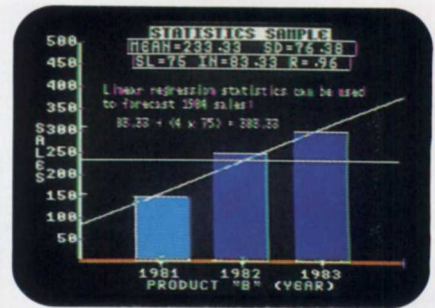


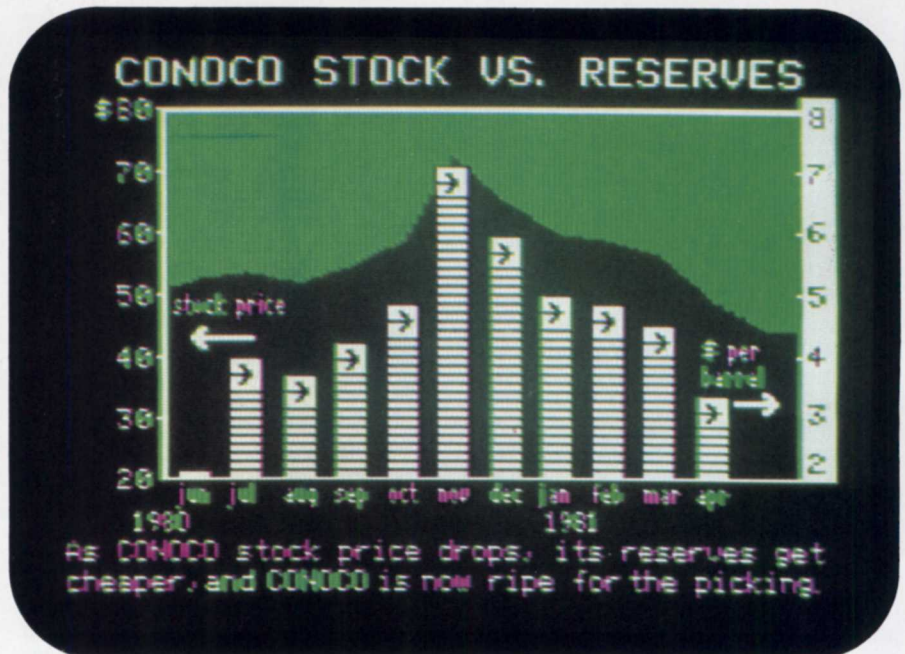
Figure 10. Trend line with statistics calculated and drawn with *The Graphics Department*.

viation, and a "best fit" trend line (i.e., a simple regression line).

Regression analysis in general and other more sophisticated forms of manipulating data are not handled in the program. Up to 99 data points can be used at one time, and any chart type can be used to describe the data once they are in memory (after all, you may not know which type of chart to use in an actual presentation until you try each of them).

If that were all *The Graphics Department* did, it wouldn't be much different from say, *PFS:Graph*. But the system, which includes three double-sided disks, can also use 20 character fonts (Figure 11), more than 100 colors, a specialized set of "graphic tools," and a slide show utility—all in addition to the standard charting utilities (Figure 12). You will find the graphics tools most useful for editing completed slides and pictures. These pictures are saved as normal Apple 33- or

Figure 9. Executive Briefing System slide.



34-sector files and are thus compatible with most other programs such as *Executive Briefing System*, *Frame-Up*, and *Screen Director*.

With the tools you can overlay, shrink, and move pieces of a picture at will. You could, for instance, take a chart, shrink it, and place it on a text slide, all in a matter of a few seconds. The tools module also allows the creation of slides and pictures from scratch, changing colors, masking portions of the screen, and adding patterns. With the slide show module, *The Graphics Department* gives you the power to display all your work. A print module allows you to print any screen on an Apple Silentyper printer, but any commercial printing program (like *Paper Graphics*) can be used to print anything produced with *The Graphics Department* on a standard dot matrix printer. One final important point: the manual is honestly readable and helpful (or is it just that the program is so easy to use).

Apple Mechanic

Another delightful program for composing primarily text slides (although it lacks the presentation facilities of *EBS* and *The Graphics Department*) is the Beagle Bros. *Apple Mechanic* for the Apple II. This inexpensive (\$2995) program includes six ready-to-use fonts and allows custom building

of fonts. Beagle Bros. also sells an accessory disk with 26 extra fonts; that should be enough of a selection of letters, numbers, and special characters to keep anyone happy. Typing text screens with *Apple Mechanic* is simple with the Xtyper program, which allows upper- and lowercase as well as various colors. Changing fonts while composing is even easier than in *EBS*, so a single slide can use as many different fonts and colors as you like.

MacPaint

MacPaint clearly falls into our general purpose graphics package category. The accompanying pictures printed on an Apple Imagewriter should demonstrate its usefulness for producing quality graphics in a business environment. *MacPaint* on the Macintosh is by far the simplest of all the graphics generators described here.

The manual for the program is trivial—who needs it? It is like providing a manual for a lead pencil. The program is most like Penguin's *Complete Graphics System* with icons representing things you would like to do. You just point and choose. Text and graphics can be easily mixed because the Mac uses only a hi-res screen (and it is really hi-res) (see Figure 13). There is no color, but there are many different types of shading. Anything on the screen can be dumped to the printer by selecting the

print option with the mouse.

Slide Shows

After you make the slides, you still need a way to display them. *Apple Mechanic* slides are useable by *EBS* and *The Graphics Department*, but if you want a less expensive display routine, I suggest the Beagle Bros. *Frame-Up*. (*EBS* costs \$199, *The Graphics Department* sells for \$124.95, and *Frame-Up* sells for \$29.50). While *Frame-Up* (for the Apple II) is not nearly as sophisticated and capable as *EBS* or *The Graphics Department* it is simple, easy to use, and cheap. Learning to use it takes about ten minutes. It performs three important functions: it allows composition of simple, one-font text screens; it displays slides in rotation at the press of a paddle button or arrow key; and it performs unattended

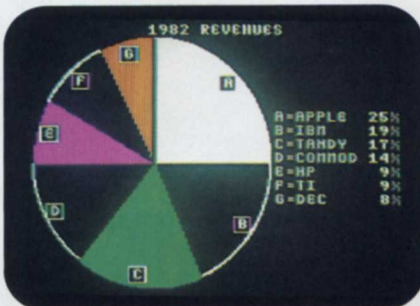


Figure 12. Standard charts are automatically produced by *The Graphics Department*.

Figure 11. Different type fonts are available in *The Graphics Department*.

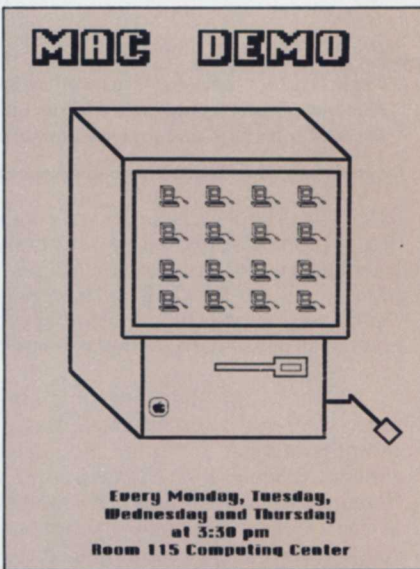


Figure 13. *MacPaint* screens dumped to an Apple Imagewriter printer with the PRINT command.

Business Graphics Software

	VisiPlot/VisiPlot	Lotus 1-2-3	PFS: Graph	Executive Briefing System	Apple Mechanic
Host Personal Computer*	Apple II, III, IBM PC	IBM PC	Apple II, III, IBM PC	Apple II	Apple II
User Interface	Menu	Menu	Menu	Menu	Keyboard overlay
Calculate Simple Statistics	Yes	Yes	No	No	No
Regression/Trend Analysis	Yes	No	No	No	No
Create Text Slides	No	Yes	Yes	Yes	Yes
Create Plots/Graphs (line, bar, pie)**	Yes	Yes	Yes	No	No
Create Pictures	No	No	No	No	No
Move Objects (animation)	No	No	No	No	No
Print Screens (slides)	Yes	Yes	Yes	Yes	No
Slide Show (auto-sequence)	No	No	No	Yes	No
Modify Graphics Slides	No	No	Only its own slides	Yes	Yes
Allows Freehand Drawings	No	No	No	No	No
3-D Rotations	No	No	No	No	No
Drives Plotter	No	Yes	Yes	No	No
Special System Requirements	128K, two disk drives for IBM PC version	192K, two disk drives color graphics			
Suggested List Price	\$300-IBM \$300-Apple	\$495	\$140-IBM \$125-II \$175-III	\$199	\$29.50

*Apple II refers to Apple II+ as well as Apple IIe systems. Most Apple II packages will also work on the Apple III in emulation mode. Also, most IBM PC programs will run on appropriately configured IBM PC compatibles.

**Created from data and drawn automatically.

by showing slides in the order you choose with a time delay chosen by you. It also has an instruction booklet which is hilarious (like all the Beagle Bros. materials). *Frame-Up* doesn't do anything other programs don't do, but it does the basics quite well indeed.

Another Apple slide show program is *Screen Director*, an exceptionally easy to use program but one quite different in concept from *Frame-Up*, *EBS*, or *The Graphics Department* slide show module. *Screen Director* is actually a simple language with which you create and edit text slides as well as print the slides and/or present them in slide show fashion. *EBS*, *Frame-Up*, and *The Graphics Department* use menus to guide you through the pro-

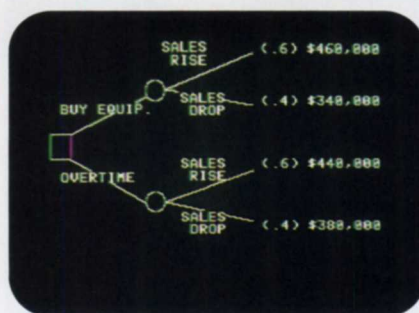


Figure 14. Part of an animated sequence, this chart was drawn with the KoalaPad and The Graphic Solution.

gram; choices are highlighted on the screen, and you move a cursor to select a particular procedure. In *Screen Director* the system is quite different. First, *Screen Director* requires two drives for production of materials, although only one drive is needed for showing presentations. Second, *Screen Director* uses English-like commands to control the system. For example: SHOW FROM 1 AUTOMATIC 10

A reference card is included with *Screen Director*, and the language is almost easy enough to use that the manual becomes more of a reference guide than a piece of required reading (I recommend, however, that you read at least the tutorial section of the manual). *Screen Director* accepts screens from most packages, in-

Comparison Chart

Frame-Up	Screen Director	The Graphics Solution	VCN Execuvision	EnerGraphics	4-Point Graphics	KoalaPad
Apple II	Apple II	IBM PC	IBM PC	IBM PC	IBM PC	Apple II, IBM PC
Menu	Command language	Menu	Menu	Menu	Status line	Touch sensitive pad
No	No	No	No	Yes	No	No
No	No	No	No	Yes	No	No
Yes	Yes	Yes	Yes	Yes	Yes	No
No	No	No	Yes	Yes	No	No
No	No	Yes	Yes	Yes	Yes	Yes
No	No	Yes	Yes	Yes	Yes	No
No	Yes	Yes	Yes	Yes	Yes	No
Yes	Yes	No	Yes	Yes	Yes	No
No	No	Yes	Yes	Yes	Yes	Yes
No	No	No	No	No	No	Yes
No	No	No	No	Yes	No	No
No	No	No	No	Yes	Yes	No
			128K, two double sided disk drives, color graphics board	128K, color graphics board	128K, color graphics board	
\$29.50	\$150	\$149.95	\$395	\$250 Plotter \$100	\$225	\$125

cluding *VisiTrend/Plot* and *Apple Mechanic*, but also has the ability to create and edit text slides. One unfortunate feature is that there is no way to add or delete material on a graphics slide. This is a real disadvantage if you wish to modify a *VisiTrend/Plot* slide; it simply cannot be done. *EBS* and *The Graphics Department*, on the other hand, do have the ability to modify graphics slides (by adding text, for example).

If you wish to use hardcopy handouts with a presentation, *Screen Director* will print all its screens to many printers as well as to the IDS Prism Color Printer. *Screen Director* will not, however, print your choice of slides but will print only all of the slides listed for one "show." Up to 17

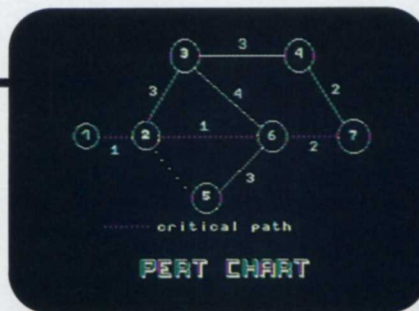


Figure 15. PERT chart drawn with *CGS* using a *KoalaPad* and lettered with *The Complete Graphics System*.

graphics may be stored on a single disk.

One of the very attractive features of *EBS* is that it offers several methods for switching from one slide to the next (dissolve, curtain rise, spiral cut). These tran-

sitions between slides enhance the presentation enormously. *Screen Director* and *The Graphics Department* have fewer options. One quite useful inclusion in the *Screen Director* package is a slide changer like those used with 35mm projectors. The two buttons work to advance and recall slides just as they would were you actually using a slide projector.

Animation, Freeform Graphics, and Unusual Devices

We have dealt with entering and transforming data, displaying the results as graphs and charts, creating text screens for explanation, and, finally, showing the

Business Graphics Software

	HyperGraphics	The Graphics Department	Paper Graphics	Super Chartman II	Graph W Calc
Host Personal Computer*	IBM PC	Apple II	Apple II	IBM PC	IBM PC
User Interface	Menu	Menu	Menu	Menu	Menu
Calculate Simple Statistics	No	No	No	No	Yes
Regression/Trend Analysis	No	No	No	No	Yes
Create Text Slides	Yes	Yes	Yes	Yes	Yes
Create Plots/Graphs (line, bar, pie)**	No	Yes	No	Yes	Yes
Create Pictures	Yes	Yes	No	Yes	Yes
Move Objects (animation)	Yes	No	No	No	No
Print Screens (slides)	No	Silentye only	Yes	Yes	Yes
Slide Show (auto-sequence)	Yes	Yes	No	Yes	Yes
Modify Graphics Slides	Yes	Yes	No	Yes	Yes
Allows Freehand Drawings	Yes	Limited	No	No	No
3-D Rotations	No	No	No	No	No
Drives Plotter	No	No	No	Yes	Yes
Special System Requirements	128K, color graphics board			128K, color graphics board	Color graphics board
Suggested List Price	\$395	\$124.95	\$49.95	\$425	\$125

*Apple II refers to Apple II+ as well as Apple IIe systems. Most Apple II packages will also work on the Apple III in emulation mode. Also, most IBM PC programs will run on appropriately configured IBM PC compatibles.

**Created from data and drawn automatically.

results as a slide show. Now that is quite a bit of ground for anyone to cover, but we haven't done anything that couldn't be done by a professional graphics department with plenty of time, a 35mm slide projector, and a lot of money. But can the computer make sophisticated presentations that do things that slide projectors are incapable of matching? You bet!

Several software packages offer powerful animation routines, sometimes in conjunction with other useful features (like 3-D graphs or libraries of prepared graphics). For the Apple II, II+ and IIe the most complete and easy to use of these packages are *The Graphic Solution* and *Graforth*. For the IBM PC there are three packages in this category: *Execuvision*, *Hypergraphics*, and *Energraphics*. Each of these packages has both strong points and weak points.

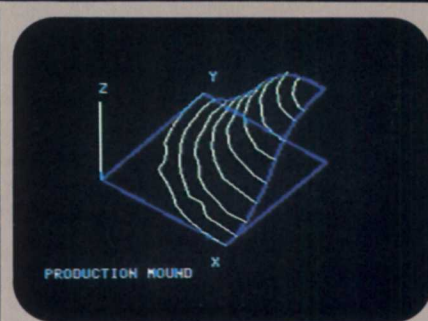
Usually the use of animation in presentations requires the knowledge of a programming language like Basic, Pascal, or Forth, but few business users are

willing to spend their valuable time learning the languages needed to address the specific graphics features of their computers.

What the businessperson (or teacher, consultant, guide, or trainer) really needs is a package that gives him the ability to create presentation quality animations and displays with relative ease.

The Graphic Solution

The Graphic Solution is one of the few Apple software packages featuring animation that could conceivably be used by a neophyte. It is a friendly system, but be aware that to create complicated animations with it requires some practice. The basic technique is to create "movies" or animated sequences frame by frame. The frames may then be edited, shown in sequence, deleted, or added to previous work. Some quite complex work can be handled by *TGS*—large image animation, animation over colored backgrounds, flicker-free animation, scrolling, and an-



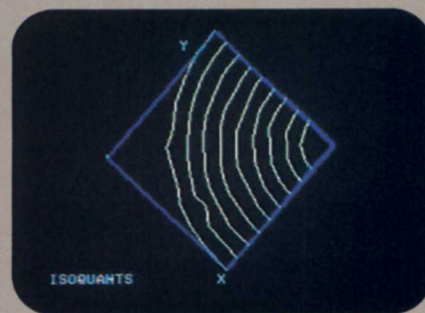
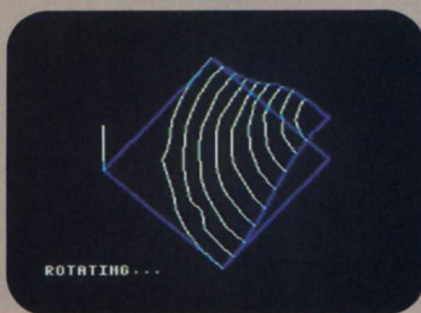
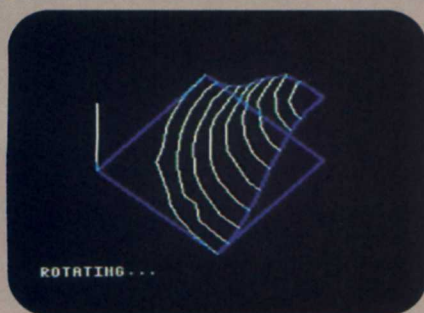
Figures 16-19. Sequential pictures of a three-dimensional rotation performed by *Graforth*.

imated text—but it takes time to learn the system. A knowledge of Applesoft Basic is also helpful for some of the applications. The documentation for *TGS*, which comes in a small three-ring binder, is well done and includes a tutorial as well as a quick-and-dirty introduction to using the package. A demonstration disk offers some insight into the capabilities of the

Comparison Chart

Super Slide Show	Graforth	Complete Graphics System	PC-Draw	MacPaint	Chartmaster
Apple II	Apple II, III, IBM PC	Apple II	IBM PC	Macintosh	Apple, IBM, TRS-80
Command language	Forth language	Menu	Menu	Mouse	Menu
No	Requires programming	No	No	No	Yes
No	Requires programming	No	No	No	Some
No	Yes	Yes	Yes	Yes	No
No	Requires programming	No	No	No	Specialized
No	Yes	Yes	Yes***	Yes	No
No	Yes	No	No	No	No
No	No	No	Yes	Yes	Yes
Yes	Requires programming	No	No	No	No
No	No	Yes	Yes	Yes	No
No	Yes	Yes	Yes***	Yes	No
No	Yes	No	No	No	No
No	No	Yes	Yes	No	No
					128K IBM, two disk drives, color graphics board
\$25	\$75	\$79.95	\$250	Included with machine	\$275

***Creates architectural type drawings.



package.

I found the most useful feature of *TGS* to be its ability to use completed screens created with other packages (like *Visi-Trend/Plot*) as backgrounds for animation in presentations.

TGS also offers one other feature of potential interest to business users which could easily be overlooked. Accent, the

manufacturer of *TGS*, also sells a *TGS/KoalaPad* interface which allows you to use a KoalaPad to input graphics into *TGS*. Since the KoalaPad has been marketed primarily for home use, its application in business graphics may be overlooked. The KoalaPad is not really a software package; it is actually a small graphics tablet sold with *MicroIllustrator*,

a software package needed to use the pad. By itself, the small KoalaPad along with *MicroIllustrator*, is capable of producing some interesting graphics which can be saved and used with other packages (Figure 14). To draw, you use a stylus (provided) or even your fingertip to trace lines on the touch sensitive pad. The KoalaPad for the Apple plugs into the gameport

Business Graphics

(there is also a KoalaPad for the IBM PC) and allows freehand drawing in any of 16 colors—something no other package mentioned in this article can do. The *Microillustrator* package uses a rubber band cursor to help draw straight lines, boxes, and circles.

The Complete Graphics System

The Complete Graphics System (CGS) is a close relative of the *Microillustrator* package. It is also an Apple package and can be used with the KoalaPad, but it is much more powerful than *Microillustrator*.

CGS is a generalized graphics package. It will not, for instance, plot the standard charts after you have entered numerical data, nor will it perform any statistical analysis, but it does offer a simple method for producing freestyle graphics for business (as well as text slides) in a "quick and dirty" manner. *CGS* is, above all, simple to use—the manual is less than 60 pages long and most of that you will read only once. With *CGS* you are offered a variety of input devices: the KoalaPad, joystick, trackball, Apple Graphics Tablet, Houston Instruments HiPad, Apple Mouse, or the reliable old keyboard. It is definitely easiest to draw with this package using one of the graphics tablets. We did not have an opportunity to try it with the mouse, but that is a close analog of a tablet and so will probably be just as easy to use.

Like *Microillustrator*, *CGS* draws perfect rectangles, circles, and straight lines for you; unlike *Microillustrator* it also helps draw ellipses, arcs, and triangles. The combination of 96 different brushes and more than 100 colors with these techniques boggles the imagination, but each technique is as easy to use as pointing to it.

Drawing is only one of the facets of *CGS*; it also produces text screens (only one font is included with the program, but 50 additional fonts are available from Penguin), draws three-dimensional objects, and drives most plotters (we tried it with an Amdek Amplot, and it performed flawlessly). Like *The Graphics Department* it also shrinks screens or parts of screens and allows you to move one part of the screen to another picture or another part of the same picture.

If you already own a KoalaPad, Apple Graphics Tablet or HiPad, you ought to have *CGS* to take full advantage of its features. Even from the keyboard, however, *CGS* is a powerful general purpose graphics package.

Figure 15 is a PERT chart drawn with the KoalaPad and *CGS*; text was added with *The Graphics Department*. The lines were defined by specifying the two endpoints, while the circles were defined by picking the center of a circle and then expanding the radius by choosing another point. This graphic could be saved to disk and used by another package

(*EBS*, for instance) or used as a background for animation by *TGS*.

While *The Complete Graphics System* can draw three-dimensional graphics and *The Graphic Solution* can create real animation, neither one can actually animate the three-dimensional color graphics themselves. That is the strong point of a program written by Paul Lutus called *Graforth* which is available for the Apple as well as the IBM PC.

Graforth

Graforth, however, is not for the novice. It is actually a programming language that allows some rather fast and slick animation. That means that to use the program, you must learn this modified Forth system—Reverse Polish Notation and all. For someone familiar with Basic, Pascal,



Figure 21. Screen created with *Hypergraphic* for use in its "presentation" facility.

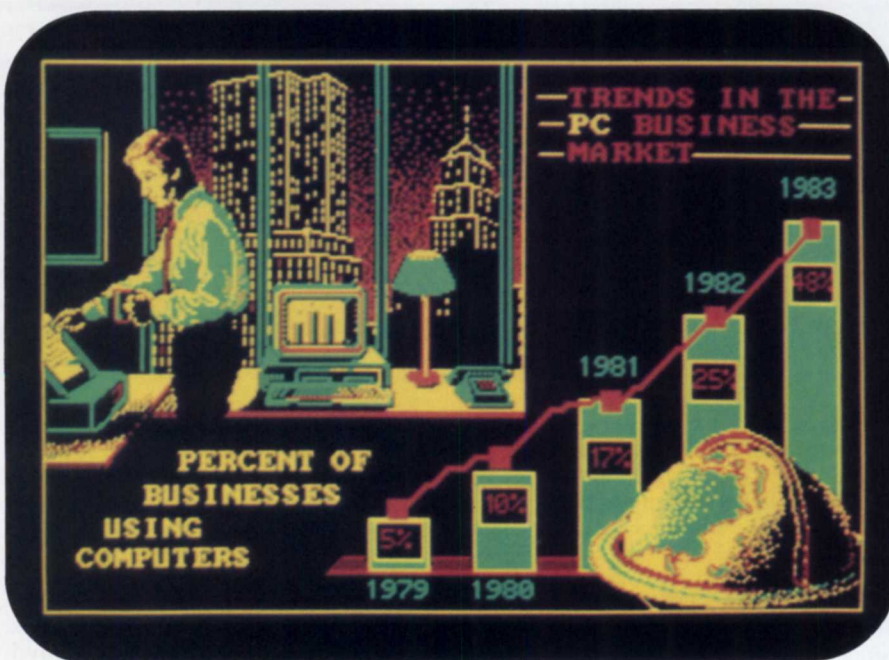


Figure 20. This figure uses *Execuvision's* business graphics ability as well as the library of pre-rendered graphics included in the basic package.

or even Fortran the task is relatively simple (but time-consuming), but for others it may be too time-consuming to be worthwhile.

Once the language is mastered, however, true three-dimensional objects can be moved about the screen and text placed anywhere you want it (see Figures 16-19). For some types of demonstrations this capability just can't be beat. It is the type of demonstration that cannot be duplicated with a chalk-talk, a set of overheads, or even a slide projector. Only a movie comes close to representing the type of displays *Graforth* is capable of creating. This specialized program is not for all, but it may be just perfect for a few users.

But *TGS* and *CGS* are not available for IBM PC users. Not to worry! IBM users have available to them three powerful and complete packages which are capable of producing many of the types of graphics we have already described with animation as well as some novel additions.

Execuvision

Execuvision is a very complete newcomer to the IBM PC market; its ease of use and totality of coverage are a delight. It can generate the normal business graphics (pie charts, bar graphs, etc.), overlay text, or create text screens. It also allows sketching, uses animation and special effects, and includes a complete slide show (automatic run-time option). *Execuvision*, however, does require somewhat more than the basic IBM PC system to operate; requirements are 128K, PC DOS 1.1, two double-sided disk drives, and a color/graphics monitor.

Execuvision is really a very complete package; it also is compatible with the IBM PC version of *VisiTrend/Plot*. Figure

20 represents a unique feature of the package: *Execuvision* includes a library of pre-rendered images for use in your presentations. Some of these library images are included with the basic package while others are available separately. The library subjects currently available are:

- Borders Collection.
- Initials and Decorative Design Collection.
- Industry and Business Catalog Collection.
- Professions: The World's Faces and Figures Collection.
- Maps and International Symbols Collection.

It surprises me that there is no comparable collection of images and backgrounds for Apple users. The use of pre-rendered graphics is certainly the easiest of all graphics techniques (i.e., "let someone else do it"). The *Execuvision* library, though, is not the most impressive part of the package; the integration of all the desired graphics techniques in one easy to use package is clearly its strong suite. No other package mentioned here combines practically all the features of the menu-driven *Execuvision*. Even considering its heavy hardware requirements and price (\$395) it stands apart from other packages. A glance at the comparison chart accompanying this article will emphasize the breadth of the *Execuvision* program.

Hypergraphics

Hypergraphics is a very sophisticated general purpose graphics package for the IBM Personal Computer; it offers features that are unavailable in other software but similar in some ways to *TGS* for the Apple. *Hypergraphics* is designed primarily for executive users but will proba-

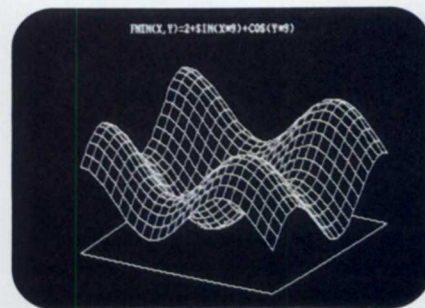


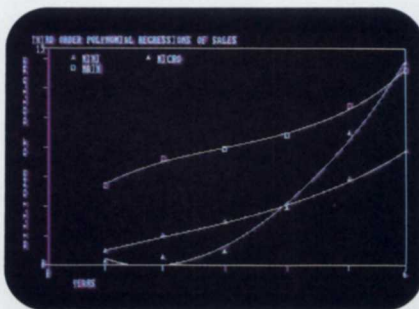
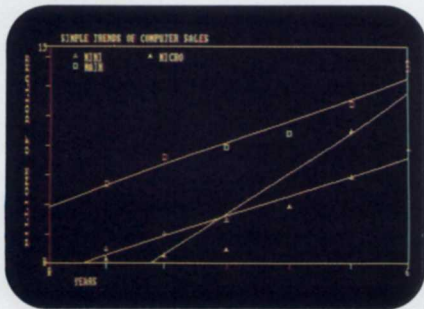
Figure 24. This three-dimensional surface was drawn by specifying the function and the ranges over which to plot it. The surface may be viewed from any angle by rotating the surface from the *Energistics* menu.

bly take longer to master than either *Execuvision* or *Energistics*.

The producers of *Hypergraphics* believed enough in their product to present the tutorial in disk form rather than in the usual walk-through manual format. The tutorial itself is produced with *Hypergraphics*. A user's manual, provided in book format, is meant to be used only as a reference manual to answer specific questions. The disk tutorial is well done, but often you need to look something up while you are in the middle of producing a presentation—that is a bit difficult if the tutorial itself is on disk.

The unique feature of *Hypergraphics* is that it can become part of one of your own programs; you may transfer control back and forth from your control program to *Hypergraphics* as needed. This means that all the capabilities of *Hypergraphics* are available within your own programs, but you do not need to learn a specialized programming language to do animation and freeform graphics. To use *Hypergraphics*, you need not know how to program, but its use in your own programs is one of its most powerful features. The *Hypergraphics* system creates presentations by making files which consist of many (up to 999) pages numbered consecutively and linked in that order. You use the *Hypergraphics* program to place information on each page.

The information you place on any given page may consist of text, graphics, and/or animation commands. Each page is distinct and can be edited separately just as each frame of a *TGS* movie could be edited on the Apple (Figure 20). Pages may be copied onto new "blank pages" and then altered slightly to show progressions of text or graphics. The presentation facility of *Hypergraphics* is like the projector module of *TGS*; both allow the pages or frames to be viewed in some preselected order. Both *Hypergraphics* and *TGS* are different from slide shows because they allow true animation and



Figures 22 and 23. These figures use trends (Fig. 22) and polynomial regression (Fig. 23) to plot sales of three different types of computers. Both statistical analysis and drawing are handled from the *Energistics* menu.

Business Graphics

because they can be called from your own programs.

Text pages may be sent to a printer, and screen images may be saved to disk in a format useable by other packages. There are no provisions for plotting.

EnerGraphics

An entirely different sort of package for IBM PC users is *EnerGraphics* which also requires 128K, two double-sided disk drives (or one drive and a hard disk), a graphics monitor (preferably color), an IBM (or compatible) graphics adapter board, and a dot matrix printer. This package requires a bit more hands-on time before you can produce presentation quality graphics when compared with *Execuvision* (and less time than it takes to master *Hypergraphics*) but that is not surprising since *EnerGraphics* is a statistical/graphics package designed to do several unique things:

- In addition to the standard pie charts and line graphics, *EnerGraphics* can do statistical analysis or fit straight line or polynomial functions (user definable) to data and plot the results (see Figures 22 and 23). It can also perform linear and polynomial regression (quite useful for economists and forecasters).
- While *Execuvision* can produce bar charts with a 3-D look, *EnerGraphics* can produce real 3-D surfaces including color, zoom capability, rotation, hidden line removal and perspective (see Figure 24).
- *EnerGraphics* also performs as a sort of word processor by allowing you to edit charts, graphs, or designs with easily addressed symbols (see Figure 25). The authors suggest such applications as flow charts, floor plans, and mechanical drawings.

EnerGraphics also has the ability to produce text screens interspersed with special user-defined symbols, and is compatible with DIF files. A slide presentation program included in the package allows you to display completed graphics in the familiar slide show fashion.

Figures 24 and 25 are produced with *EnerGraphics* using its simple menu-driven production routines. These screens can be saved and used in the slide show routine (included) or printed or plotted for hardcopy handouts. *Execuvision*, *EnerGraphics*, and *Hypergraphics* all offer demonstration disks for prospec-

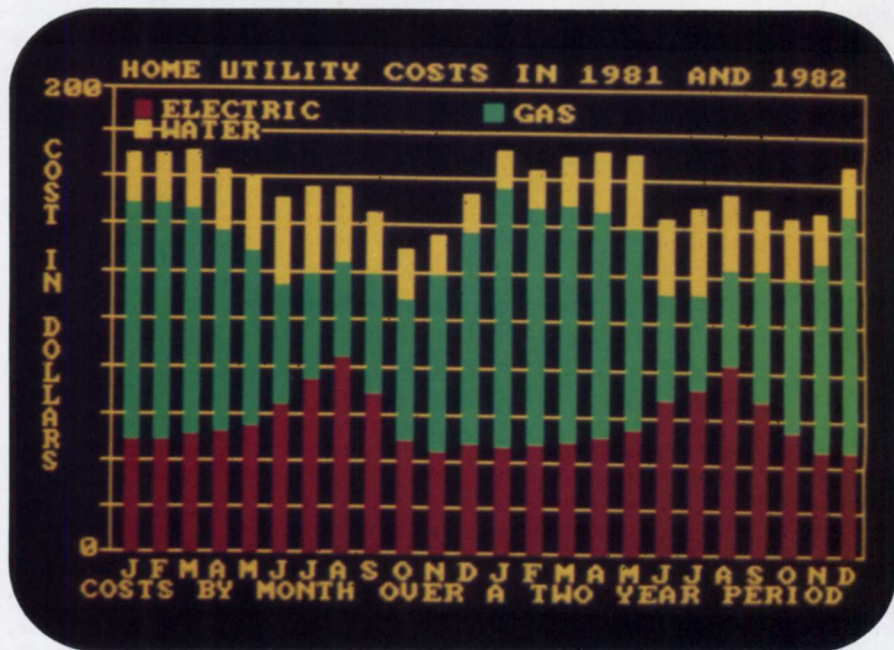


Figure 25. *Energraphics* slide with a combination of text and graphics.

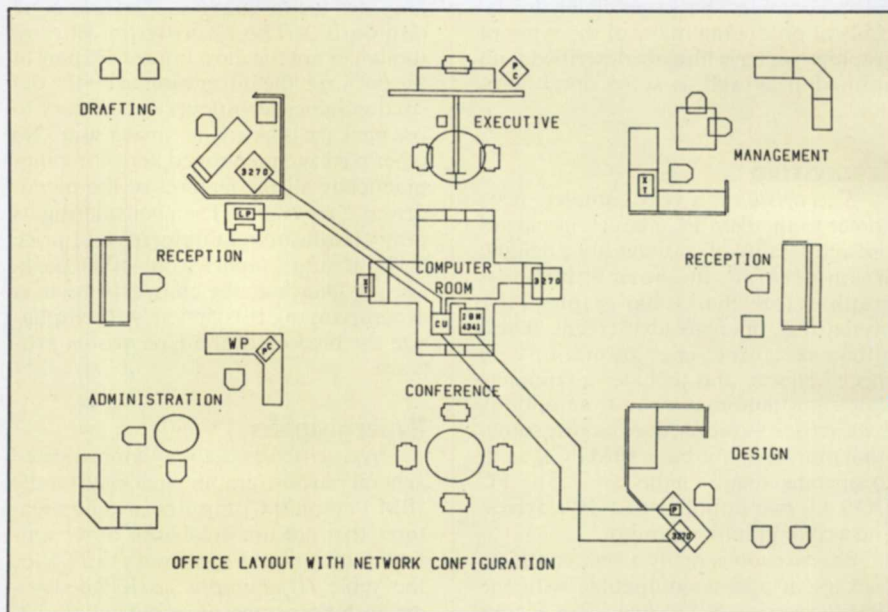


Figure 26. *PC-Drawdraftsman*-like rendering.

tive purchasers, which provide an exciting method of viewing each package in action.

Single Purpose Programs

Some programs just do not fall into the general categories we outlined earlier; *PC-Draw* is one of these. While it will no doubt be very useful and even a necessity for some users, it is a specialized tool designed to mimic the art of a draftsman (see Figure 26). With *PC-Draw* you can make up specialized templates which consist of symbols you may elect to use anywhere on the

graphics page. Presumably, an engineer would make up one template while an architect might use a different template altogether. Some ready-made templates are included with *PC-Draw* but you are provided with tools to create new templates for any specialized task.

PC-Draw is designed mainly to complete drawings of any type which use repetition of a symbol or graphic design. Drawings are saved to disk or printed in one of many different modes (e.g., regular, compressed, emphasized). While most users will probably use *PC-Draw* with keyboard entry, the program does

support light pen entry. Two modes are provided for drawing; one is a high-resolution (640 x 200 pixels) black and white mode while the other is a medium-resolution (320 x 200 pixels) color mode.

Chartmaster

Chartmaster is another single-purpose package for people who require a charting tool for financial and commodity markets. The program is most useful to those who follow some markets quite closely and depend heavily upon certain chart forms and statistics as predictors of future prices or trends. An automatic updating system allows a phone call (via modem) to supply daily information to be absorbed by *Chartmaster* without the need to key the data in by hand.

Chartmaster is a highly specialized package intended only for investors, as evidenced by the types of specialized graphics it produces: high-low-close bar

charts, point-and-figure charts, moving average charts, and spread charts/basis charts.

The IBM version of the program can handle 450 trading days of information on a number of different stocks or commodities and display the information in graphic form. Charts may be "zoomed" to explode the price action covering a particular period or scrolled in *VisiCalc* fashion to view earlier trading. It sure beats looking all the data up and charting it by hand. Trendlines (actually ten different forms of trend analysis) are available as well as five different moving averages.

The update-by-modem feature of *Chartmaster* is optional, and you may enter data manually if you so desire. Manual data entry is quick because the program is designed to accept data in recognized formats only, allowing for week-ends and so on. The manual includes not only instructions on how to use *Chart-*

master but also a tutorial on hedging and finding buy and sell signals in commodity markets. This software offers you a solid opportunity either to lose your lunch money or to strike it rich.

One final note about specialized packages has to do with the color screen photos accompanying this article. Most of the graphics shown here were reproduced on 35mm slides by Computer Slide Express. This company provides the service of turning your Apple or IBM graphics into 35mm color slides or overhead transparencies. You mail them your 5 1/4" disk with the graphics on it, and they return your unaltered disk and the slides or overheads within a few days. You may even send your Apple graphics over the phone via modem with a software package supplied by them; each slide requires about two minutes to transfer in a packed format (using a routine written by Mark Pelczarski of Penguin Software.) ■

Directory of Business Graphics Products

Company Names, Addresses

Product, Computer(s) Price, Comments

Beagle Bros.
3rd floor
4315 Sierra Vista
San Diego, CA 92103
(800) 854-2003

Apple Mechanic (Apple)/\$30/An easy to use utility package which includes a text generator for creating text slides or adding text to existing slides.

Professional Farm Software
219 Parkade
Cedar Falls, IA 50613
(800) 553-2910

Chartmaster (Apple, IBM, TRS)/\$275/Specialized commodity and stock trading graphic aid allowing updates by telephone.

Penguin Software
830 4th Ave.
P.O. Box 311
Geneva, IL 60134
(312) 232-1984

The Complete Graphics System (Apple)/\$79.95/Truly a complete general purpose graphics producer. Extremely easy to use with options galore. Allows input from keyboard, mouse, joystick, or graphics tablet. Even drives a plotter.

Company Names, Addresses

Product, Computer(s) Price, Comments

Computer Slide Express
Visual Horizons
180 Metro Park
Rochester, NY 14623
(716) 424-5300

Computer Slide Express (IBM, Apple)/\$6 per slide/This company produces 35 mm slides or overhead transparencies from your computer's graphics. You send the disk; they return both disk and slides.

Enertronic Research, Inc.
150 North Meramec, Suite 207
St. Louis, MO 63105
(800) 325-0174

Energraphics (IBM)/\$250/Multi-faceted package capable of many statistical operations in addition to true three-dimensional graphics. An excellent forecasting and display package for business uses.

Lotus
161 1st St.
Cambridge, MA 02142
(617) 492-7171

Executive Briefing System (Apple)/\$199/General purpose graphics and presentation package. Quite easy to use.

Directory of Business Graphics Products

Company Names, Addresses

Product, Computer(s) Price, Comments

Prentice-Hall, Inc.
200 Old Tappan Rd.
Old Tappan, NJ 07675
(800) 345-8112

Execuvision (IBM)/\$395/Combination business graphics package and general purpose graphics package. Includes pre-rendered graphics and animation capability. Easy to use yet powerful.

IMSI
633 Fifth St.
San Rafael, CA 94901
(415) 454-7101

4-Point Graphics (IBM)/\$225/Menu-driven general purpose graphics package with slide show routine for presentations.

Beagle Bros.
3rd Floor
4315 Sierra Vista
San Diego, CA 92103
(800) 854-2003

Frame-Up (Apple)/\$30/Slide show routine also capable of producing text screens.

Insoft, Inc.
P.O. Box 608
Beaverton, OR 97005
(503) 641-5223

Graforth (Apple, IBM)/\$75/Programming language capable of producing fast, smooth three-dimensional rotations, text screens and many types of two-dimensional graphics. Not for the novice.

Sensible Software, Inc.
6619 Perham Dr.
West Bloomfield, MI 48033
(313) 399-8877

The Graphics Department (Apple)/\$124.95/A combination business graphics package and general purpose graphics producer with many options (e.g., standard charts, slide show, many type fonts, etc.). A bargain considering its many talents.

Accent Software, Inc.
3750 Wright Pl.
Palo Alto, CA 94306
(415) 856-6505

The Graphic Solution (Apple)/\$150/Unique general purpose graphics package which features animation. Can be used with a KoalaPad with a software interface provided by the same company.

Desktop Computer
Software, Inc.
Suite 29-303
303 Portrero St.
Santa Cruz, CA 95060
(408) 458-9095

Graph N' Calc (IBM)/Combination statistics and graphics especially useful for forecasting. Many statistical options used in spreadsheet format. Produces standard business graphics.

Hypergraphics Corporation
807 West Hickory, Suite 202
Denton, TX 76205
(817) 565-0004

Hypergraphics (IBM)/\$395/General purpose graphics package that can be used in your own programs along with self-contained productions and presentations. On-disk tutorial. Capable of animation.

Koala Technologies Corp.
4962 El Camino Real
Suite 125
Los Altos, CA 94022
(408) 986-8866

KoalaPad/MicroIllustrator (IBM, Apple, Commodore, Atari)/\$125/Small graphics tablet with software for producing free-form graphics. Easy to use and quite reasonably priced.

Company Names, Addresses

Product, Computer(s) Price, Comments

Lotus
161 1st St.
Cambridge, MA 02142
(617) 492-7171

Lotus 1-2-3 (TI Professional, DEC Rainbow, Wang Professional, Grid Compass, IBM PC)/\$495/A combination spreadsheet, database, and graphics package capable of the standard business graphics and some statistical calculation. Widely used.

Apple Computer Inc.
20525 Mariani Ave.
Cupertino, CA 95014
(408) 996-1010

MacPaint (Macintosh)/comes with system/General purpose graphics package similar to *The Complete Graphics System* for the Apple II. Very easy to use.

Penguin Software
830 4th Ave.
P.O. Box 311
Geneva, IL 60134
(312) 232-1984

Paper Graphics (Apple)/\$49.95/Screen dump allowing the printing of any screen to a multitude of printers. Many options including magnification, adding text, rotation, etc. Good value.

Micrografx, Inc.
1701 N. Greenville, Suite 703
Richardson, TX 75081
(214) 234-1769

PC-Draw (IBM)/\$250/Specialized drawing tool for creating extremely fine architectural-type flowcharts, organization charts, layouts or forms. Uses a template for symbol selection.

Software Publishing Corp.
1901 Landings Dr.
Mountain View, CA 94043
(415) 962-8910

PFS:Graph (IBM, Apple)/\$125-\$175/Business graphics package which is part of a complete line of software including a database manager (*PFS:File*) and a word processor (*PFS:Write*).

Business and Professional
Software, Inc.
143 Binney St.
Cambridge, MA 02142
(617) 491-3377

Screen Director (Apple)/\$150/Slide show program which uses a simple command language. Comes with a hand controller for presentations.

Wadsworth Electronic
Publishing Company
Statler Office Building
20 Park Plaza
Boston, MA 02116
(800) 322-2208

Statpro (Apple, IBM)/\$1995/A complete statistics package coupled with a powerful database and graphics program. Includes all the statistical tools commonly used in business.

Graphic Software Inc.
1972 Massachusetts Ave.
Cambridge, MA 02140
(617) 491-2434

Super Chartman II (IBM)/\$425/Business graphics package designed to produce the standard charts only.

Animation Graphics
11317 Sunset Hills Rd.
Reston, VA 22090
(703) 471-0740

Super Slide Show (Apple)/A plain vanilla slide show routine.

VisiCorp
2895 Zanker Rd.
San Jose, CA 95134
(408) 942-6000

VisiTrend/Plot (IBM, Apple)/\$300/Combination statistics and graphics program capable of quite complex forecasting complete with graphics display ability.

Have we got an ear-full for you.

Votrax voice synthesizers let your computer talk to you in a world of sound.

Now your ears are as important as your eyes when working with your computer. With a **Votrax** voice synthesizer your computer talks, and it talks to you in a world of sound you never thought possible.

Votrax was one of the first pioneers in the field. The **Votrax SC-01A** speech chip is state of the art, the one many other manufacturers use in their own equipment.

What it means to you is unparalleled speech capability. **Votrax** voice synthesizers pronounce words by using their basic building blocks rather than utilizing a vocabulary of a few hundred words. It assures you of an unlimited vocabulary. And an unlimited range of sounds: from jet planes to an advanced musical range.

Best of all, **Votrax** speech synthesizers are "smart," requiring no computer memory for operation. Your computing capacity stays free for other tasks. Small in size yet surprisingly economical, **Votrax** voice synthesizers are sophisticated pieces of equipment that hook-up in seconds.

Mix speech or sound, program sound frequencies or amplitude levels, or compose your own music with either the **Votrax Type 'N Talk™** or **Personal Speech System**.

Ideal for business, school, handicapped use or the home, **Votrax** voice synthesizers put a world of sound in your computer.

See your local computer retailer or call toll free for more product, warranty or ordering information: 1-800-521-1350 (in Michigan call 313-588-0341). Dealer inquiries welcome.



Votrax[®], INC.

1394 Rankin • Troy, Michigan • 48083-4074

OUR AD
#C6

THE WORLD'S LARGEST COMPUTER MAIL ORDER FIRM

ALL MAIL: Conroy-LaPointe, Inc. 12060 SW Garden Place, Portland, OR 97223
SHOWROOMS AT: PORTLAND, OR and SEATTLE, WA — BOTH OPEN M-SAT 10-6

HARDWARE for your APPLE

APPLE IIe, STARTER SYSTEM BY APPLE CALL



APPLE MACINTOSH CALL
LIMITED WARRANTY is 100% Parts & Labor for 90 days by us.

DISK DRIVES

AMDEK Amdisk I, 3" Micro-Floppy, 143K \$299 \$249

* CENTRAL PT., Filer, Utility & Apple DOS \$20 \$15

μ-SCSI * A2, 143K Disk Drive \$479 \$219
A2 Controller Card \$100 \$79
* A4Q, 160K, Drive \$449 \$299
MICRO-SCI * A7Q, 286K, Drive \$599 \$299
A4Q/A7Q Controller \$100 \$79

1/2 HIGH ALPS, A4Q, Belt Drive, 163K \$299 \$199
DRIVES TEAC, T4Q, Direct Drive, 163K \$349 \$219
TEAC, T8Q, Double Sided, 326K \$449 \$299
Controller Card by ComX \$110 \$59

Rana Elite 1, 163K, 40 Track \$379 \$239
Elite 2, 326K, 80 Track \$649 \$399
Elite 3, 652K, 160 Track \$849 \$499
Elite Controller \$145 \$89

RAM EXPANSION

* ComX, 80 col. + 64K RAM for IIE, 1 Yr. Wty. \$199 \$99
RAM Card, 1 Yr. Wty. (II+) \$179 \$99
* Microsoft, RAM Card (II+) \$16K \$100 \$69
* Titan/WICO, RAM Card (II+) \$32K \$249 \$169
RAM Card (II+) \$64K \$425 \$299
RAM Card (II+) \$128K \$599 \$399



VIDEO CARDS

* ALS, Smarterm II (+ or e) SPECIAL \$179 \$119
* ComX, 80 col. + 64K RAM (IIE) 1 yr. wty. \$199 \$99
* Videx, VideoTerm 80 col. (+ or e) \$279 \$189
UltraTerm (+ or e) \$379 \$279
Soft Video Switch (II+) \$35 \$25
Enhancer II (II+) \$149 \$99
Function Strip (II+) \$39 \$25
We Have Full Videx Line. Call Up to 35% off.

MISCELLANEOUS

ALS, The CP/M Card V3.0 (+ or e) SPL \$399 \$269
2-Card II (+ or e) CP/M 2.2 SPL \$169 \$109
ASTAR, RF Modulator, to use TV \$35 \$25
* CCS, Serial Interface 7710 (Set BAUD) \$150 \$99
Chalkboard, Power Pad \$100 \$75
* Eastlake, Wild Card (copier, II+) SPL \$110 \$59
Wild Card 2 (copier, + or e) \$140 \$59
Kearnsington, System Saver \$90 \$65
Key Tronic, KB200 keyboard (II+) \$239 \$219
Koala, Touch Tablet w/ Micro Illustrator \$125 \$85
Kraft, Joystick (Ap II/II+) \$65 \$49
Paddle (Ap II/II+) \$50 \$39
* M&R, Sup R fan (+ or e) \$50 \$39
* Microsoft, 280 Softcard (+ or e) \$345 \$345
280 Softcard Plus (+ or e) \$465 \$465
280 Softcard Premium (II+) \$695 \$479
280 Softcard Premium (IIE) \$495 \$339
* MicroTek, Dumping 64, Buffer \$349 \$269
* Orange Micro, Grappler Plus (+ or e) \$149 \$119
16K Buffer Board for Grappler Plus \$175 \$119
Buffered Grappler Plus, 16K \$245 \$179
Paymar, Lower Case Chip, Rev. 7 (II+) \$50 \$39
* PCPI, Applicard, 14 features 6Mhz \$375 \$275
RH Electronics, Super Fan II \$75 \$59
* Titan/Saturn, Accelerator II \$599 \$399
Transend/SSM, A201, Serial/Para I/F \$225 \$169
TG Products, Game Paddles (II+) \$40 \$29
Joystick (II+) \$60 \$45
Videx, PSIO I/F Card \$229 \$169
WICO, Micro, Complete \$179 \$119

SOFTWARE for your APPLE

BUSINESS & TRAINING

* Applied Soft Tech., VersaForm \$389 \$259
Articel, Magic Window II \$150 \$99
* Ashton-Tate, dBase II (Req CP/M 80) \$700 \$375
Friday (Req CP/M 80) \$295 \$199
* BPI Systems, GLARAP, PR or INV, each \$395 \$269
* Broderbund, Bank St. Writer or Spell, ea. \$70 \$45
* Continental, GLARAP or PR, each \$250 \$165
Home Accountant \$75 \$49
Tax Advantage \$70 \$47
CODEX, for Visual, Multitap or Supercalc \$60 \$40
Dow Jones, Market Analyzer \$350 \$275
Market Manager \$300 \$235
Market Microscope \$700 \$525
Fox & Geller, Quickcode or dGraph, ea. \$295 \$185
dUtility (for dBase II) \$99 \$66
Hayden, Jet Writer (Specify 80 col. bd) \$150 \$99
* Howard Soft, Tax Preparer, 1984 \$250 \$185
LJK, Letter Perfect w/ Mail Merge \$150 \$99
Micro Pro, (all require 280-CP/M Card) \$695 \$295
WordStar w/applicard & CP/M SPECIAL \$695 \$295
* InfoStar w/applicard & CP/M SPECIAL \$695 \$295
WordStar™ + Training Manual \$495 \$239
SpellStar™ + Mailmerge™, ea. SPECIAL \$250 \$129
WordStar Professional™, ea. SPECIAL \$695 \$355
Options Pak, SS/MM/SI SPECIAL \$295 \$155
Microsoft, Multi-Pak, Apple DOS \$195 \$129
* Osborne/ComX, (Disk and Book) (Stat., Bus. & Math) \$100 \$49
Some Common Basic Programs (75 ea.) \$100 \$49
Practical Basic Programs (40 ea.) \$100 \$49
* Peachtree, Requires CP/M & MBasic, 64K Series 40 GL & AP, all 3 \$395 \$239
Perfect, Perfect Writer/Spell 2 pak (CP/M) \$299 \$249
Perfect Writer or Perfect Calc (CP/M) \$249 \$149
Perfect Writer/Spell/Filer/Calc (4) \$969 \$499
Pearlsoft, Personal Pearl \$295 \$195
Quark, Word Juggler & Lexicheck (IIE) \$189 \$139
Sensible, Sen. Speller or Bookends, ea. \$125 \$85
Sierra-On-Line, ScreenWriter Pro, 2 Pak \$200 \$135
ScreenWriter II \$130 \$89
The Dictionary NEW! \$100 \$69
Gen. Manager II-NEW! \$230 \$155
Homework \$50 \$34
* Silicon Valley, Word Handler \$60 \$39
List Handler \$50 \$35
* Handler Pak (Word, List & Spell) \$130 \$89
Software Publishing, PFS: File \$125 \$84
(specify + or e) PFS: Report \$125 \$84
PFS: Graph \$125 \$84
PFS: Write (IIE) \$125 \$84
Stoneware, DB Master Version 4.0 \$350 \$229
DB Utility I or II \$129 \$87
VisiCorp, Visicalc 3.3 (II+) \$250 \$169

VisiCorp, Visicalc Enhanced (IIE) \$250 \$179
Visicalc Advanced (IIE) \$295 \$210
VisiCalc, VisiCalc, each \$250 \$179

UTILITY & SYSTEM

Beagle, Apple Mechanic or Deskquik, ea. \$30 \$22
Double Take or GPLE, each \$35 \$25
Typefaces (Req. Ap. Mechanic) \$20 \$15
DOSS (Boss or Utility City, each) \$30 \$22
Tip Disk #1 \$20 \$15
Pronto DOSS \$30 \$20
Alpha Plot \$40 \$27
Central Point, Filer, DOS 3.3 & Util. \$20 \$15
Copy II Plus (bit copier) \$40 \$30
* Einstein, Compiler—Applicard BASIC \$129 \$85
Epson, Graphics Dump \$70 \$53
Hayes, Terminal Prog. (SM or MM, ea.) \$100 \$65
* Insoft, GrafORTH II by Paul Lutus \$90 \$65
Microsoft, ALDOS \$125 \$85
Fortran 8.0 \$195 \$135
* Omega, Locksmith (bit copier) \$100 \$75
Penguin, Complete Graphics System II \$70 \$53
Graphics Magician \$60 \$41
Phoenix, Zoom Grafik \$40 \$34
Quality, Bag of Tricks \$40 \$29
Terrapin, Logo \$150 \$89
Ultimo, Essential Data Duplicator III \$80 \$49

HOME & EDUCATIONAL

Atari, Centipede, PacMan or Donkey K, ea. \$35 \$28
Beagle Bros., Beagle Bag \$30 \$22
Bluechip, Millionaire \$60 \$40
Broderbund, Choplifter or Lode Runner, ea. \$35 \$25
Arcade Machine \$60 \$40
Apple Panic \$30 \$21
BudgeCo., Pinball Constr. Set \$40 \$27
* Continental, Home Accountant \$75 \$49
DataSoft, Arctar or Zaxxon, each \$40 \$27
Edu-Ware, (Large Inventory) Call
Hayden, Sargon II (Chess) \$35 \$29
Sargon III (Chess) \$50 \$34
Infocom, Zork I, II, III, or Starcross, each \$40 \$27
* Insoft, 3 Game Pak, Zaxxon, \$82 \$25
Spider Raid/Grapple \$82 \$25
Koala, Full line in stock, CALL
Learning Co., (Large Inventory) Call
Micro Lab, Miner 2009er \$40 \$27
Microsoft, Typing Tutor \$25 \$17
Monogram, Dollars and Sense \$100 \$69
Origin, Ultima III \$60 \$40
Scarborough/Lightning, MasterType \$60 \$40
Sierra-On-Line, Ultima II \$60 \$40
Sir-Tech, Wizardry \$50 \$39
Spinmaker, Kindercomp (others in stock) \$30 \$20
Sub Logic, Flight Simulator II \$50 \$37

PRINTER COMBO SALE

ONE TIME, QUANTITY LIMITED

* OKIDATA MICROLINE 80



80 cps,
Pin/friction feed, 80 col.,
132 col. compressed
96ASCI, Graphics, Parallel
List Price \$299, Call for our low price

COMBO A for Apple or IBM — \$549 save \$450
ML80 + dBase II

COMBO B for Apple or IBM — \$494 save \$500
ML80 + WordStar + Mail Merge + SpellStar + Star Index

COMBO C for Apple II + e — \$474 save \$520
ML80 + Applicard (CP/M + 13 Features) + WordStar or InfoStar

COMBO D for IBM PC — \$397 save \$550
ML80 + 50 Generik™ SS/SD diskettes + Bank Street Writer + Home Accountant Plus + 3 Insoft Tris educational games.

COMBO E for Apple II + e — \$291 save \$420
ML80 + 50 Generik™ SS/SD diskettes + Bank Street Writer + Insoft 3 game pak + Home Accountant

★ MEANS A BEST BUY

DISKETTES

	LIST PRICE	OUR PRICE
AMDEK, 3" Diskettes, Pac-10	\$60	\$49
CDC, 100 ea SS/DD, 40T (Apple, IBM)	\$550	\$239
100 ea SS/DD, 40T (Apple, IBM)	\$55	\$26
100 ea SS/DD, 40T (IBM, H/P)	\$750	\$269
10 ea DS/DD, 40T (IBM, H/P)	\$75	\$35
DYSAN, 10 ea DS/DD (Apple, etc.)	\$41	\$29
10 ea DS/DD 48T (IBM, H/P, etc.)	\$69	\$43
MAXELL, 10 each, MD1, SS/DD	\$55	\$29
10 each, MD2, DS/DD	\$75	\$39
VERBATIM, 10 each MD525-01, SS/DD	\$49	\$25
10 each MD34, DS/DD	\$84	\$35

GENERIK™ DISKETTES — AS LOW AS \$1

W/Jackets, no labels, top quality. 90 day limited warranty by us.

	LIST PRICE	OUR PRICE
10 ea SS/SD, 35 Track (Apple, Atan)	\$42	\$17
100 ea SS/SD, 35 Track (Apple, Atan)	\$415	\$130
1000 ea SS/SD, 35 Track (Apple, Atan)	\$4150	\$995
10 ea DS/DD, 48T (IBM, H/P)	\$63	\$25
100 ea DS/DD, 48T (IBM, H/P)	\$626	\$170
1000 ea DS/DD, 48T (IBM, H/P)	\$6260	\$1400

NO HASSLE MONEY BACK GUARANTEE ON GENERIK'S

I GIVE YOU MY WORD

GENERIK™ DISKETTES
Each at 1000 quantity.

SS/SD \$1.00 Each
DS/DD \$1.40 Each

SM 1983 by ComX Corp.

for the ATARI
RANA 1000 Drive, 320K \$449 \$369
KOALA Pad w/Micro Illus. \$100 \$75

MODEMS AND ACCESSORIES

	LIST PRICE	OUR PRICE
ANCHOR, Signalmn MK I (RS232)	\$99	\$75
Signalmn Mark XII	\$399	\$269
HAYES, IBM-PC Smartmodem 1200B	\$599	\$419
IBM-PC Smartmodem II Software	\$149	\$109
Microcommod II w/Smartcom	\$329	\$239
Microcommod II (S-100 bus)	\$399	\$275
Stack Chronograph (RS-232)	\$249	\$189
IBM-PC to Modem Cable	\$289	\$225
Smartmodem 1200 (RS-232)	\$699	\$535
NOVATION, ACCESS I-2-3	\$39	\$29
Apple II to 300 BAUD	\$595	\$399
Apple II to 1200 BAUD	\$389	\$249
212 Apple Cat, 1200 BAUD	\$725	\$559
Cat	\$189	\$139
J-Cat	\$149	\$104
212 Auto Cat	\$695	\$579
103/212 Smart Cat	\$595	\$415
TRANSEND/SSM, Transend I for Apple II	\$89	\$69
ModemCard for the Apple II	\$299	\$259
Transmodem 1200	\$695	\$559

SOFTWARE-SEE APPLE OR IBM UTILITY SOFTWARE SECTIONS

MONITORS AND ACCESSORIES

	LIST PRICE	OUR PRICE
* AMDEK, 12" Green, #300G	\$200	\$125
* 12" Amber, #300A	\$210	\$149
* 12" Amber, #310A for IBM-PC	\$230	\$149
* 13" Color + Composite	\$379	\$289
* 13" Color II, RGB, H Res. (IBM/Apple)	\$529	\$439
* 13" Color IV, RGB, 720Hx400V (IBM)	\$755	\$685
DVI, Color II to Apple II/I/F	\$199	\$175
* PRINCETON, RGB H Res. HX 12	\$795	\$499
RGB H Res. SR 12	\$799	Call
* Amber, Mac12 (Mono Brd.)	\$249	Call
* QUADRAM, Quadchrome 12" RGB Color	\$695	\$475
Quadscreen 17" 96x512	\$1995	\$1595
ZENITH, 12" Green, MKL ZVM123	\$200	\$99

PLOTTERS

AMDEK, Amplot II, 6 pen, 10x14 Bed \$1099 \$899

PRINTERS AND ACCESSORIES

	LIST PRICE	OUR PRICE
DOT MATRIX:		
EPSON, RX80, 100 cps	\$399	\$299
FX80, 160 cps	\$699	\$495
FX100, 160 cps	\$895	\$689
MX100/TF, 80cps, w/Graftrax+	\$995	\$495
Apple II Graphics Dump	\$15	\$9
MANNESMANN 160L, 80 col. 160cps	\$798	\$568
TALLY, 180L, 132col, 160cps	\$1098	\$778
Sort, 80 col, 80 cps	\$399	\$299
* OKIDATA, 82A, 80 col, 120 cps, para.	349	\$119
83A, 132 col, 120 cps, para.	749	\$599
92, 80 col, 160 cps, para.	599	\$469
93, 136 col, 160 cps, para.	999	\$749
2350SP Pacemark 350cps, para.	2695	\$2095
2410FP Pacemark 350cps, para.	2995	\$2395
ORANGE MICRO/Grapple+, for Apple	\$165	\$119
PRACTICAL, Microbuff In-Line 64K Para.	\$349	\$259
Microbuff In-Line 64K Ser.	\$499	\$259
QUADRAM, Quadjet, Jet Color Printer	349	Call
* STAR MIC, Gemini 107X, 120cps, 2.3K	\$499	\$289
Gemini 157X, 120cps, 2.3K	\$549	\$439

LETTER QUALITY:

AMDEK, 5040, 40 cps, Para. & Ser. Call
* TTX, 1014, 13cps, Para.&Ser., Pin&Frnc. \$649 \$399

PRINTER INTERFACES AND BUFFERS:

IBM-PC to Epson or Star Micro. Cable \$60 \$35
Apple I/F & Cable for Epson or Gemini \$95 \$59
QUADRAM, Microfazer, w/Copy, PP, 8K, HMP8 w/PS \$189 \$139
Microfazer, w/Copy, PP, 64K, HMP64 w/PS \$319 \$239
Microfazer, w/Copy, PP, 128K, w/PS \$465 \$345
Microfazer, Snap-on, 8K, PP, Epson w/PS \$179 \$145
Microfazer, Snap-on, 64K, PP, Epson w/PS \$139 \$135
All Microfazers are expandable w/Copy to 512K (Snap-on to 64K)
SUPPLIES: Tractor Feed Paper, Ribbons, Daisy Wheels.

41CX, Calculator NEW! \$325 \$275
41C, Calculator \$195 \$149
41CV, Calculator w/2.2K \$275 \$219

HYPERION, Portable Computer \$3690 \$2990

CASH & CARRY OUTLETS:

Over the counter sales only. Open Monday through Friday, 10:00 until 6:00. Saturday, 10:00 until 6:00.
PORTLAND, OREGON—NEW LOCATION! At Park 217, Targit at intersection of 217 and 99W. Coming from Portland on 99W, take immediate left after 217 overpasses and Texaco Station. Call 620-5555.
SEATTLE, WASH.—3540 128th Ave. SE, Bellevue, WA 98006 Tel. 641-4736. In Leachman's Plaza near Factoria Square, SE of Hwy 405 & 90 and at SE 38th & Richards.

ORDERING INFORMATION AND TERMS: MAIL TO: 12060 SW Garden Place, Portland, OR 97223—Include telephone number and double check your figures for S&H! All items usually in stock. Cash/Checks, Money Orders, Foreign 1000 checks immediately honor. Personal or other Company Checks allow 20 days to clear. No C.O.D. Prices reflect a 3% cash discount so ADD 3% to above prices for VISA or MC. For U.S. Mainland, add 3% (5% minimum) for shipping, insurance and handling (\$54H) by UPS. UPS ground is standard so add 3% (\$10 minimum) more for UPS Blue for S&H. Add 12% total (\$15 minimum) for S&H for Air Post, APO or FPO. For Hawaii, Alaska and Canada, UPS is in some areas only, all others are Postal so call, write, or specify Postal. Foreign orders except Canada for S&H add 18% (\$25 minimum) for S&H except for monitors add 30% (\$50 minimum) for S&H. All prices, availability and specifications subject to errors or change without notice so call to verify. All goods are new, include warranty and are guaranteed to work. Due to our low prices and our assurance that you will get new unused products, ALL SALES ARE FINAL. Call before returning goods for repair or replacement. Orders received with insufficient S&H charges will be refunded. ORDER DEADLINE: 9 A.M. to 6 P.M. PST, Monday through Friday and 10 A.M. Saturday. 6 A.M. here is 9 A.M. in New York.

OUR REFERENCES: We have been in computers and electronics since 1958, a computer dealer since 1978 and in computer mail order since 1980. Bank: 1st Interstate Bank, (503) 643-4678. We belong to the Chamber of Commerce (503) 228-9411, and Direct Marketing Association, or call Dunn and Bradstreet if you are a subscriber. EconoRAM™, Fastak™, and Generik™ are trademarks of Conroy Corporation.

-LA POINTEsm

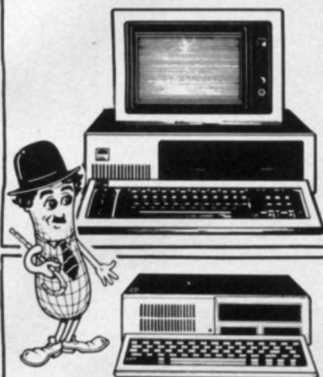
Formerly **Computer Exchange**

DEALERS
WE BUY
EXCESS
INVENTORIES

LOW PRICES TO PROFESSIONALS WHO KNOW WHAT THEY WANT AND KNOW HOW TO USE IT!

© 1984 by Conroy-LaPointe, Inc.
All Rights Reserved

256K IBM-PC or XT 320/360K Disk Drives by CDC 90 Day Limited Warranty By Us Call for Details



Coming soon — products for the PC Jr.
© 1984, Service Mark of Conroy-LaPointe, Inc.

DRIVES AND ACCESSORIES

CONTROL DATA OR Tandon

320K/360K DS/DD DISK DRIVES
With Detailed Installation Instructions
30 Day Limited Warranty by Factory Authorized Distributor

Same as now **\$199** **\$209** For One.

CDC HALF \$189 HEIGHT

Amdek
Amdek V, 1/2 height, internal, 320/360K
Cable, Amdek III to IBM-PC interface

CDC, 1/4 Dual Drive Install Kit

ComX
"T" Disk Drive Power Cable

* Internal 10 meg Hard Disk & I/F
(same as PC to XT by Maynard below)

MAYNARD

Floppy Drive Control Board —
up to 4 drives with Parallel Port \$ 300 \$ 239

PC to XT 10 meg CONVERSION KIT from MAYNARD

Internal 10 meg Hard Disk & I/F Card \$1395 \$1150

Quality engineered to work with DOS 2.0/2.1. Completely IBM XT compatible. All you need is your DOS Manual. Easy to install. Includes 10 Megabyte Hard Disk, Sandstar WS1 Multifunction Card and Hard Disk Controller Module. Card will accept up to three Sandstar Modules. Other configurations available.

TAVA-PC IBM COMPATIBLE

TAVA-PC, 256K, 2 Half Height CDC 360K Drives, Disk Controller, Color Graphics Card and:

- with no Monitor \$2345 \$1995
- with Amdek Amber Monitor 310A \$2575 \$2139
- with Amdek Green Monitor 300G \$2545 \$2139
- with Amdek Color I+ Monitor \$2724 \$2279
- with 1 floppy, 10 MB Hard Disk IBM XT Compatible by ComX \$3995 \$2795

We find the TAVA-PC to be as compatible with the IBM-PC as the Compaq, Eagle and Columbia. PC World (April 1984) says, "The TAVA-PC strongly resembles the IBM-PC in looks and operation."

#C6

VISA

master charge



NO SALES TAX

SUPPLY CENTER for IBM-PC or XT

AMDEK	MAI 4-in-1 Multiple Board, Color Graphics, Mono, 128K	\$ 599	\$ 519
AST	Large AST Inventory, CALL		
	CompoPlus, 64K, S/P/C	\$ 395	\$ 265
	CompoPlus, 256K, S/P/C	\$ 695	\$ 495
	MegaPlus II, 64K, 2S/P/C	\$ 495	\$ 345
	MegaPlus II, 256K, 2S/P/C	\$ 795	\$ 595
	256K MegaPlus II Expander	\$ 395	\$ 295
	SixPakPlus, 64K, S/P/C +S/W	\$ 395	\$ 265
	SixPakPlus, 256K, S/P/C +S/W	\$ 695	\$ 495
	SixPakPlus, 384K, S/P/C +S/W	\$ 895	\$ 595
	For SixPak w/ Game Port, add	\$ 50	\$ 39
	I/O Plus II, S/P/CC	\$ 215	\$ 150
	I/O Plus II, S/P/CC/G	\$ 265	\$ 185
	I/O Plus II, S/P/CC/G	\$ 315	\$ 215
	MonoGraphPlus™ Card (for Lotus)	Call	
	PCNet, Starter Kit, PC002	\$1095	
	PCNet, Circuit Board, PC001	\$495	
	Supervision, 132 col, mono, board	\$ 799	\$ 599

CCS	Power Pad, Req. Kit	\$ 100	\$ 73
Chalkboard,	EconoRAM™ 256K RAM Card w/Fasttrak™ RAM disk emulator and spooler software.	\$ 495	\$ 325
*ComX			
CURTIS	UNI-I, Monitor tilt & swivel base	\$ 50	\$ 39
	3 to 9 foot keyboard cable	\$ 40	\$ 30
	Vertical CPU "System Stand"	\$ 25	\$ 19
	Monochrome Ext. Cable Pair	\$ 50	\$ 35

HERCULES	Graphics Card, Mono	\$ 499	\$ 349
Key Tronic	KBS150, Std. keyboard	\$ 209	\$ 159
	KBS151, Std. keyboard	\$ 255	\$ 189
	KBS151 jr. keyboard	\$ 255	\$ 189
	Koda Pad™ w/PC Design Programmer's Guide	\$ 150	\$ 109
		\$ 15	\$ 12

Koala	Multifunction IG Card, MFC	\$ 89	\$ 79
MAYNARD	Memory Card no RAM	\$ 230	\$ 169
SANDSTAR	Memory Card 256K	\$ 499	\$ 399
SERIES	HardDisk I/F Module (HOM)	\$ 495	\$ 395
	HardDisk Cable	\$ 30	\$ 27
	Para Port Module (PPM)	\$ 59	\$ 49
	Serial Port Module (SPM)	\$ 95	\$ 79
	Clock Cal. Module (CCM)	\$ 55	\$ 48
	Game Adapter Module (GAM)	\$ 49	\$ 43
	Memory Module "TK" (MMO)	\$ 122	\$ 102
	Memory Module 256K (MM256)	\$ 422	\$ 357
	XT10 meg Hard Disk & I/F	\$1395	\$1150

MICROSOFT

SystemCard 256K	\$ 625	\$ 469
SystemCard 64K	\$ 395	\$ 295
Mouse	\$ 195	\$ 145

MOUSE SYSTEMS, PC Mouse w/software

	\$ 295	\$ 195
--	--------	--------

PLANTRONICS

Color Board & Colormagic, 16 color, w/Para	\$ 559	\$ 395
Color Board & Draftsman, 16 color, w/Para	\$ 559	\$ 395

QUADRAM

* Quadlink	NEWEST VERSION	\$ 680	\$ 485
Quadboard, no RAM, expand to 384K		\$ 295	\$ 215
Quadboard 64K, expand to 384K		\$ 395	\$ 279
Quadboard 256K, expand to 384K		\$ 675	\$ 525
* Quadboard, 384K		\$ 795	\$ 625
Quadboard II, no RAM, expand to 256K		\$ 295	\$ 215
Quadboard II, 64K, expand to 256K/2S/CC		\$ 589	\$ 399
Quadboard II, 256K, 2S/CC		\$ 595	\$ 395
Quad 512 x 64K plus serial port		\$ 325	\$ 265
Quad 512 x 256K plus serial port		\$ 550	\$ 420
Quad 512 x 512K plus serial port		\$ 895	\$ 625
Quadcolor I, board, 16 colors		\$ 295	\$ 215
* Quadcolor II, board, use with Quadcolor I		\$ 275	\$ 199
Quadvue, board, Mono/S/P/CC		Call	
* Quadchrome, 12" RGB Monitor		\$ 795	\$ 499
Quadchrome, 17" 968 x 512 Monitor		\$1995	\$1595

Tecmar

Graphics Master	\$ 695	\$ 545
1st MATE, 64K, S/P/CC	\$ 389	\$ 275
2nd MATE, 256K, S/P/CC	\$ 589	\$ 399
Captain, 64K/S/P/CC	\$ 424	\$ 324
Captain, 384K/S/P/CC	\$ 795	\$ 595
Wave, 256K (short brd.)	\$ 499	\$ 369
Bosun, S/P/CC (short brd.)	\$ 195	\$ 145

Titan

Accelerator PC (8086 + 128K)	\$ 995	\$ 750
------------------------------	--------	--------

TG PRODUCTS

Joystick	\$ 60	\$ 40
----------	-------	-------

WICO, IBM-PC Mouse

	\$ 100	\$ 69
--	--------	-------

SOFTWARE for IBM-PC or XT

BUSINESS & TRAINING

ALPHA , Database Manager II	\$ 295	\$ 185
ASHTON-TATE		
Framework user's July/Aug	NEW \$695	\$ 575
* dBase II, Inq. PC-DOS & 128K	\$ 700	\$ 375
dBase II User's Guide (Book)	\$ 30	\$ 20
Everyman's DB Primer (Book)	\$ 15	\$ 12
The Financial Planner	\$ 700	\$ 395
Friday	\$ 295	\$ 199
APPLIED SOFT. TECH. , Versaform	\$ 389	\$ 265
ASK MICRO , GLARAP/INV or PR, each	\$ 595	\$ 295
ATI Training Programs—Wide line in stock	\$ 80	\$ 56
* BRODERBUND , Bank Street Writer	\$ 595	\$ 395
BPI, Gen'l Acctg./ARAP or PR, each	\$ 70	\$ 47
CDEX , Training for ... (Large inventory)	\$ 495	\$ 335
CHANG LABS , Micro Plan	\$ 150	\$ 89
* CONTINENTAL , Home Accountant	\$ 70	\$ 45
Tax Advantage	\$ 125	\$ 85
FCM (Filing, Cataloging, Mailing)	\$ 495	\$ 329
Property Management	\$ 350	\$ 279
DOW JONES , Market Analyzer	\$ 300	\$ 239
Market Manager	\$ 700	\$ 525
Market Microscope		

FOX & GELLER		
Quickcode, dGraph, Grafox or Oz, each	\$ 295	\$ 195
dUhl (MSDOS or CP/M/86, each)	\$ 99	\$ 59
HAYDEN , IBM Pie Writer	\$ 200	\$ 135
Pie Speller or Sargon II, each	\$ 50	\$ 34

HOWARDSON		
Tax Preparer, 1984 for 1983 year	\$ 295	\$ 220
HUMAN EDGE , Management or Sales, ea.	\$ 250	\$ 169
IUS , EasyWriter II System	\$ 350	\$ 259
EasySpeller II	\$ 100	\$ 68
Business System: GL+AR+AP	\$1495	\$995
GLARAP/DE or INV, each	\$ 595	\$ 395

* INSOFT , Data Design (easy to use DBMS)	\$ 250	\$ 125
GrafORTH (animated 3D graphics)	\$ 125	\$ 95
LOTUS , Volkswriter	\$ 285	\$ 195
LOTUS , 1-2-3 (Book)	\$ 495	\$ 309
QUE , Using 1-2-3 (Book)	\$ 15	\$ 12
MICRO LAB , Tax Manager for 1983	\$ 250	\$ 169
MICROPRO , WordStar	\$ 495	\$ 239
MailMerge™	SPECIAL \$250	\$129
CorrectStar™	SPECIAL \$195	\$125

* WORDSTAR Professional, 4 Pak	SPECIAL \$695	\$355
Options Pak, SS/MM/SJ	SPECIAL \$295	\$155
Starliner™	SPECIAL \$195	\$109
InfoStar™	SPECIAL \$495	\$259

* MICROCRIM , R-base Series 4000	\$ 495	\$ 299
MICROSOFT , Word	\$ 195	\$ 129
Word with Mouse	\$ 475	\$ 325
Financial Statement	\$ 100	\$ 69
Budget	\$ 150	\$ 99

BUSINESS & TRAINING

MONOGRAM , Dollars & Sense	LIST PRICE \$165	OUR PRICE \$110
MULTIMATE , Multimate	\$ 495	\$ 295
OPEN SYS , GLARAP/INV or PQ, each	\$ 695	\$ 429
* OSBORNE/COMX , Book & Business, Statistics & Math Programs on (DS/DD Disks)		
Some Common Basic Programs (70 ea.)	\$ 100	\$ 69
Practical Basic Programs (40 each)	\$ 100	\$ 69
PBL , Personal Investor 1.1	\$ 145	\$ 99
PEACHTREE , Peach Pk (GLARAP)	\$ 395	\$ 239
Peach Tree 5000	\$ 395	\$ 239
PEARLSOFT , Personal Pearl		
(DBMS & MIS)	\$ 295	\$ 195
* PERFECT , Perfect Writer™	\$ 349	\$ 219
Writer & Speller, 2 Pak	\$ 399	\$ 249
Perfect Filter™ or Perfect Calc, each	\$ 249	\$ 149
Perfect Writer, Speller, Filer, Calc (4)	\$ 699	\$ 499
SATELLITE , Word Perfect	\$ 495	\$ 255
SOFTWARE ARTS , TK Solver	\$ 399	\$ 299
SOFTWARE PUBLISHING , PFS:File	\$ 140	\$ 94
PFS:Report	\$ 125	\$ 84
PFS:Write	\$ 140	\$ 95
PFS:Graph	\$ 140	\$ 95
SORCIM , SuperCalc 2	\$ 295	\$ 195
SuperCalc 3	\$ 395	\$ 265
SSI/SATELLITE , WordPerfect	\$ 495	\$ 375
Personal WordPerfect	\$ 195	\$ 149
STC/SOFTC , The Creator	\$ 300	\$ 195
STONEWARE , Advanced D.B. Master	\$ 595	\$ 395
SYNAPSE , File Manager	\$ 100	\$ 67
SYNERGISTIC , Data Reporter	\$ 250	\$ 169
T/MAKER , T/Maker III	\$ 275	\$ 169
VISICORP , VisiCalc IV	\$ 250	\$ 179
Symphony, any July/Aug	NEW \$695	Call
VisiFile or VisiSchedule	\$ 300	\$ 219
Desktop Plan I	\$ 300	\$ 219
VisiWord with VisiSpell (128K)	\$ 375	\$ 269

UTILITY & SYSTEM		
-----------------------------	--	--

1983 CL SOFTWARE AWARD:		
--------------------------------	--	--

"Copy II PC by Central Point Software is still one of the best software buys of available. It will copy more copy protected software and faster than any other backup system. Unlike other copiers it makes an exact duplicate of your original and it does 100% verification of copy. Documentation is excellent."

UTILITY & SYSTEM

* CENTRAL POINT , Copy II PC Backup	\$ 40	\$ 30
* COMX , Fasttrak™, RAM/Disk emulator and printer spooler program. Works on any PC/DOS version or RAMCard. Menu Drive	\$ 100	\$ 59

CHIP & MEMORY SPECIALS



Prices and availability subject to change. Call.

\$55

★ 9 Each, 64K, 200 ns, MEMORY CHIP KIT

90 Day Warranty by us

\$325

\$295 Two or more.

* ComX EconoRAM™ 256K BOARD

Fully Compatible 1 Year Limited Warranty by ComX
With Fasttrak RAM Disk Emulator and Spooler Software
Works on DOS 1.1, 2.0 or 2.1

★ MEANS A BEST BUY

UTILITY & SYSTEM

DIGITAL RESEARCH		
Concurrent CP/M-86	\$ 350	\$ 225
Concurrent CP/M-86™ w/ windows	Call	
CP/M-86™	\$ 60	\$ 40
CASAC 86™	\$ 200	\$ 135
CASAC Compiler (CP/M-86 or MSDOS, ea.)	\$ 600	\$ 365
Pascal/MT+ (CP/M-86)	\$ 400	\$ 269
Pascal/MT+ (MSDOS)	\$ 600	\$ 399
PL/I (MSDOS or CP/M-86, each)	\$ 750	\$ 499
Access Mng. (MSDOS or CP/M-86, each)	\$ 400	\$ 269
Display Mng. (MSDOS or CP/M-86, each)	\$ 500	\$ 339
Speed Prog. Pkg. (CP/M-86)	\$ 200	\$ 135
CIS COBOL-86	\$ 850	\$ 525
DR LOGO-86	\$ 100	\$ 69
HAYES , SmartCom II (Data Com.)	\$ 119	\$ 89
INSOFT , GrafORTH (animated 3D graph)	\$ 125	\$ 95
MICROSTUF , Crosstalk XVI (Data Com.)	\$ 195	\$ 129
Business BASIC Comp.	\$ 600	\$ 399
Pascal Compiler	\$ 300	\$ 199
C Compiler	\$ 500	\$ 329
BASIC Compiler	\$ 395	\$ 269
FORTRAN Compiler	\$ 350	\$ 259
COBOL Compiler	\$ 700	\$ 469
NORTON , Utilities 2.0, 14 programs	\$ 80	\$ 65
ROSESOFT , Prokey	\$ 130	\$ 89

HOME & EDUCATIONAL

ATARI , Centipede, PacMan or Donkey, each	\$ 35	\$ 28
EPYX/Auto. Sim. , Temple of Apshai	\$ 40	\$ 29
ARMONK , Executive Suite	\$ 40	\$ 27
BLUE CHIP , Millionaire or Tycoon, each	\$ 60	\$ 39
BPI SYSTEMS , Personal Accounting	\$ 195	\$ 139
* BRODERBUND , Apple Panic (Color)	\$ 30	\$ 19
Lode Runner or Serpentine, each	\$ 35	\$ 24
COMPENHIL , PC Tutor (I.1 or 2.0 ea.)	\$ 60	\$ 40
CONTINENTAL , Home Accountant Plus	\$ 150	\$ 89
DAVIDSON , The Speed Reader II	\$ 75	\$ 49
INFOCOM , Deadline or Suspended, each	\$ 50	\$ 33
Zork I or Zork II or Zork III, each	\$ 40	\$ 27
* INSOFT , Mystrix, Wordrix or Quotrix, each	\$ 35	\$ 25
MICRO LAB , Miner 2049	\$ 40	\$ 26
MICROSOFT , Flight Simulator	\$ 50	\$ 33
MONOGRAM , Dollars & Sense	\$ 165	\$ 110
ORIGIN , Ultima III	\$ 60	\$ 40
PBL CORP. , Personal Investor	\$ 145	\$ 99
SCARBOROUGH/LIGHTNING , MasterType	\$ 50	\$ 34
SOFTWARE SYSTEMS , Ultimate	\$ 495	\$ 325
SPINNAKER , Snapper Trainers (1 or 2)	\$ 35	\$ 25
Story Machine or Face Maker	\$ 35	\$ 25
STRATEGIC , The War Factor	\$ 40	\$ 28
SUBLOGIC , Night Mission Pinball	\$ 40	\$ 28

Growing Up Literate

Spelling and Spatial Relationships

This month, all the programs we review are of excellent quality. We look at two spelling packages and a reading program designed for elementary school students.

The publishers of these fine programs range from one of the best known producers of educational software in this country to a tiny company we first saw in a mini-booth at the West Coast Computer Faire to a Canadian company with distributors in the U.S. and U.K.

Spelldiver

Spelldiver from Scholastic Wizware is another offering from educational game designer extraordinaire Tom Snyder. The setting is the ocean floor on which you find words covered with a thick seaweed-like lettermoss. Your assignment is to remove enough of the lettermoss to enable you to guess the word.



SOFTWARE EVALUATION

Betsy Staples

The cleaning process is not difficult; you have only to swim over the mossy letters, and the area over which you pass is cleared. Once you have cleared a portion of a letter, you can switch on your sonar scope and view all the uncovered areas at once. When you think you can identify the word, you must swim back to your boat and type in your guess, but be careful, you get only one free guess per word and you must spell it correctly the first time.

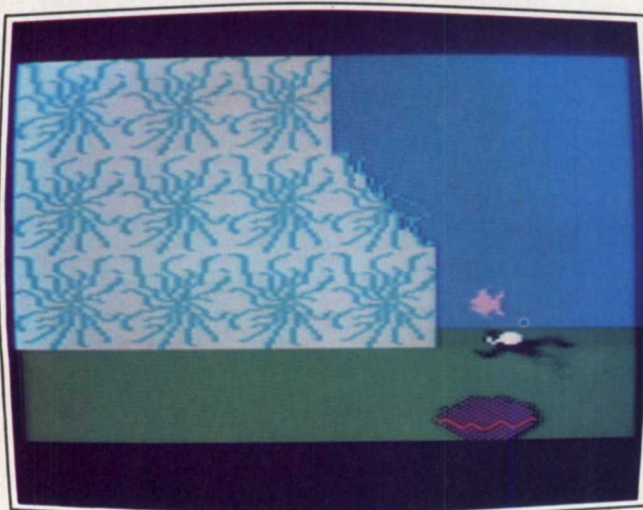
Additional factors that keep the game interesting include a limited supply of air, pearls on the sea floor that can net

you extra guesses, and the flipper-nipper whose bite immobilizes you long enough to waste some of your precious air.

You score 50 points for each letter that you identify correctly and 15 points for each pearl you have left after guessing the word. You can earn extra points by identifying the word before your air supply is exhausted.

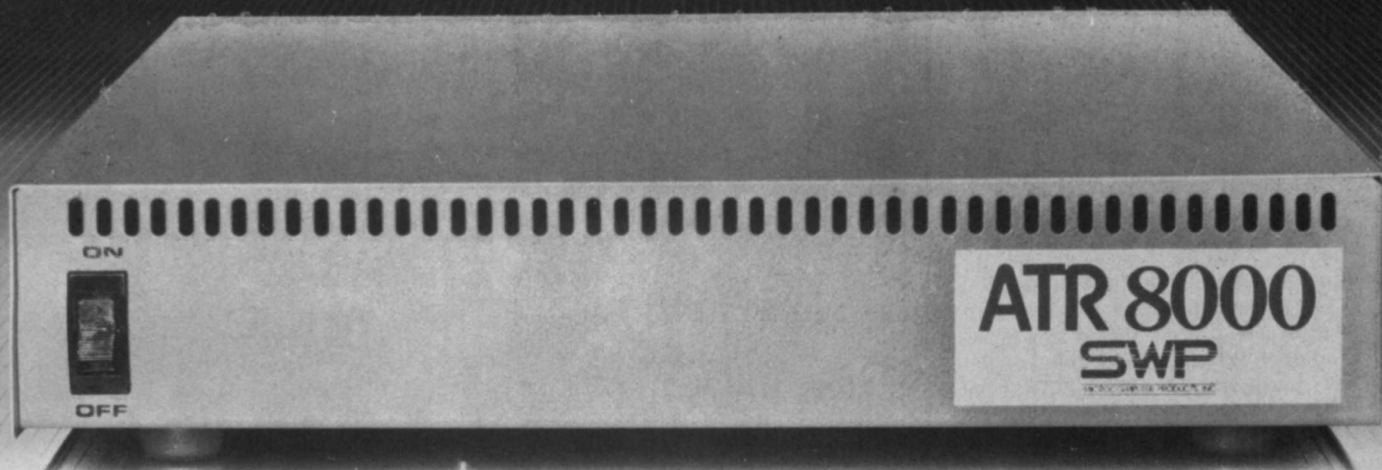
You control the confident lady swimmer Oshianna Jones with the joystick and switch back and forth from the undersea scene to the sonar scope by pressing the fire button.

There are three modes of play. The first, Gabdoc's Notes Home, gives you a bit of an advantage by showing the context of the word. The notes, which are printed in the instruction manual, purport to have been written long ago by a creature from outer space. Each of the 30 notes has 20 missing words which range in length from three to ten letters.



Spelldiver

CP/M and MS-DOS Compatibility For All Atari Computers



"A fine CP/M machine . . . the ATR8000 closes the gap that has separated Atari owners from the rest of the software market."

—Byte Magazine

CP/M compatibility for your Atari — only from SWP.

Now you can run CP/M programs on your Atari 400, 800, 1200 and XL series computers.

The ATR8000 from SWP Microcomputer Products is a 4MHz, 16k RAM complete Atari interface. When you add the optional 64k RAM, the ATR8000 will run CP/M!

The ATR8000 features:

- 64k RAM
- RS-232 port with software to run a serial printer or modem.
- The ability to run up to four 5 1/4" or 8" drives of any mixture, type and density (MY-DOS is optional and is used for double density Atari operations).
- Double density CP/M 2.2.
- 80 column wide display with 40 column moveable window. Or an optional 80 column software (AUTOTERM-80) program that can be used with a black & white TV or monitor.

When you order your ATR8000, you'll not only receive the hardware and software you need, but also an easy to read owner's manual and CP/M supplement that will take you into the exciting world of CP/M.

Add MS-DOS compatibility too!

An Atari that runs MS-DOS, IBM-PC software?

By adding CO-POWER-88, our own 8088 co-processor to your ATR8000, you can also run most of the popular MS-DOS, IBM-PC software.

The CO-POWER-88 is a 16 bit, 5.33 MHz, 8088 co-processor with 128k or 256k RAM. It comes complete with MS-DOS and RAM disk software. CP/M-86 is available as an option.

More than just a co-processor, its RAM can also be used as a high speed simulated disk drive for CP/M.

Installation is simple. Your CO-POWER-88 comes with the Z-80 adaptor board and main processor board. You'll also receive a complete owner's manual and easy-to-follow instructions.

CP/M and MS-DOS, IBM-PC compatibility for your Atari can now be yours.

Contact your local SWP dealer or order direct by mail. Better yet, for fastest delivery, use your credit card and shop by phone.

Credit Card Orders Save Time!
Call 817-469-1181 or 817-861-0421 And Order Now
Or Mail Coupon to: SWP, 2500 E. Randol Mill Rd., Suite 125, Arlington, TX 76011

Please ship the following:

- ☐ 16k ATR8000 Atari Interface @ \$350.00 + \$10.00 shipping.
- ☐ 64k ATR8000 w/CP/M @ \$499.95 + \$10.00 shipping.
- ☐ 128k CO-POWER-88 with MS-DOS @ \$400.00 + \$10.00 shipping. *
- ☐ 256k CO-POWER-88 with MS-DOS @ \$500.00 + \$10.00 shipping. *
- ☐ CP-86 (16-Bit Disk Operating System) @ \$60.00 + \$5.00 shipping.
- ☐ MY-DOS (Atari-like Disk Operating System) @ \$29.95 + \$2.00 shipping
- ☐ AUTOTERM-80 (80 column display for CP/M or MS-DOS) @ \$29.95 + \$2.00 shipping

* Must be used with 64k ATR8000.

Specify Atari model computer you own: _____

Configurations: (check one) 5 1/4" drive _____ or 8" drive _____

☐ I want to learn more about the ATR8000 and CO-POWER-88. Enclosed is \$1.00. (no checks please) for more literature, including a comprehensive listing of MS-DOS and CP/M-86 software that runs on the CO-POWER-88.

Method of payment:

- ☐ Personal Check enclosed (must clear bank before shipping)
- ☐ Certified Check or Money Order enclosed.
- ☐ Change the following credit card:

☐ Master Card ☐ Visa

Credit Card # _____

Master Card Bank # _____ Exp. Date _____

Subtotal: _____ + Shipping _____ + Sales Tax (Texas Residents add 5%) _____ =

Total Enclosed: _____

Name _____

Address _____

City _____ State _____ Zip _____

Phone (h) (____) _____ (w) (____) _____

Signature _____

SWP

MICROCOMPUTER PRODUCTS, INC.

2500 E. Randol Mill Rd., Suite 125, Arlington, TX 76011

© 1984, SWP Microcomputer Products, Inc. Trademarks: CO-POWER-88 and ATR8000, SWP Microcomputer Products, Inc., IBM-PC, International Business Machines; Z80, Zilog; MS-DOS, Microsoft, Inc.; CP/M and CP/M-86, Digital Research, Inc.; Atari, Atari, Inc.

Dashes indicate the letters in each missing word.

The notes tell an amusing story and provide effective practice in using context to derive hints about unfamiliar words. The higher numbered notes are longer and feature longer words. They reward players who have worked to build their vocabularies simply because it is easier to guess a word in context if you know its meaning.

The second mode of play is called Power Spelling. If you choose this mode, the words that must be identified are chosen from a list of 2000 commonly used words. As play begins, you specify the number of letters (3-10) you want to be in the words you will be guessing. In some ways, it is more difficult to guess the words in this mode, because you have no context to provide clues. For the same reason, however, Power Spelling seems a bit less educational than the other modes; there is no motivation to learn the meanings of the words.

The third mode is aptly named Do It Yourself and invites you to enter your own list of up to 20 words. The instructions for Do It Yourself are provided on the screen and should present no problem for even the computer novice.

The documentation suggests entering your spelling list or making your own "fill in the blanks" game.

Documentation

The instruction manual is an attractive, 32-page booklet that includes the simple instructions and 30 of Gabdoc's Notes Home. There are no educational objectives, and only one paragraph suggests different ways to use the program.

Included in the hard plastic binder is a

reference card that lists loading instructions, defines important keys, and reminds you how to accomplish the most important actions required by the game. Also included are a *Spelldiver* poster, six stickers—three of Oshianna and three of the flipper-nipper—and a "sketch pad" which is just a sheet of glossy paper with

Spelldiver is a simple, well executed game that should help children learn to recognize letters and spell words of various difficulty.

a grid printed on it. You are advised to draw the uncovered letter parts on the grid with a grease pencil, but none of our playtesters found it necessary to do so.

Summary

Spelldiver is a simple, well executed game that should help children learn to recognize letters and spell words of varying difficulty. Identifying the words in context is of even greater value since it encourages vocabulary development, and we applaud the authors for couching the missing words in a clever and challenging format.

CIRCLE 407 ON READER SERVICE CARD

Attack of the Spelling Bees

From a product of education giant Scholastic, we move to a package produced by the Jay Gee Programming Company, a small company in San Jose, CA. *Attack of the Spelling Bees* comes in a simple cardboard envelope with unpretentious documentation. The disk label is printed on a dot matrix printer, and the disk itself is unadorned by even the simplest envelope.

As we have said before, however, you can't judge a program by its packaging—or even the lack of it: *Attack of the Spelling Bees* is a great educational game.

The only bad part of the game is trying to explain it, so let's take it slowly. The playfield is the entire screen around the four edges of which appear large letters in three colors, red, blue, and white. Inside the letter border are two bee-shaped tokens, one blue and one red.

The game can be played by one or two players. If one person plays, only one bee is active, although the other remains

on the screen causing a bit of a roadblock since the player can't move past or over him. In the two-player game, both bees are active, but still cannot move over or around their opponents.

As play begins on the beginner level, two-, three- and four-letter words travel slowly across the screen. Each word has an asterisk (flowers the documentation calls them) in place of one missing letter.

Your task is to figure out the correct spelling of each word and complete it using the letters that border the screen. To do this, you position your bee next to the letter you want to insert and press the fire button when the word is in range. This is not as easy as it sounds.

The first complication is that you can use only letters that match the color of your bee or the white letters, which are available to both players. The second difficulty is that periodically, the border letters change position slightly. How frustrating it is to wait patiently by a letter for the appropriate word to cross your firing path only to have the letter move just as you press the trigger!

Nor can you be certain that the letters needed to fill in the words currently on the screen are available. When you shoot, the letter you have shot disappears to be replaced by another that is selected at random. If there are no useful letters in your border, you must fire just to eliminate some and hope that the replacements will be better.

Another hurdle is that there may be more than one correct way to complete a given word. Ca _ e, for example, could be cake, cane, cape, or any of several other words, and it is up to you to guess which consonant the author has in mind. For any word that is not completed in

SOFTWARE PROFILE

Name: Spelldiver
Type: Educational game
Suggested Age: 6 and up
Author: Gabrielle M. Savage and Thomas F.F. Snyder
System: 48K Atari 800, C-64; joystick
Format: Disk
Summary: Simple, well executed letter/word recognition game.
Price: \$29.95
Manufacturer: Scholastic Inc.
 1290 Wall Street West
 P.O. Box 641
 Lyndhurst, N.J. 07071
 (201) 939-8050

SOFTWARE PROFILE

Name: Attack of the Spelling Bees
Type: Educational game
Suggested Age: 6 and up
System: 32K Atari
Format: Disk
Summary: Addictive spelling game for all ages
Price: \$39.95
Manufacturer: The Jay Gee Programming Company
 7185 Blue Hill Dr.
 San Jose, CA 95129
 (800) 227-1617 ext. 217
 (nationwide)
 (800) 772-2545 ext. 217
 (in CA)

Pic.Builder™ lets your imagination run wild!



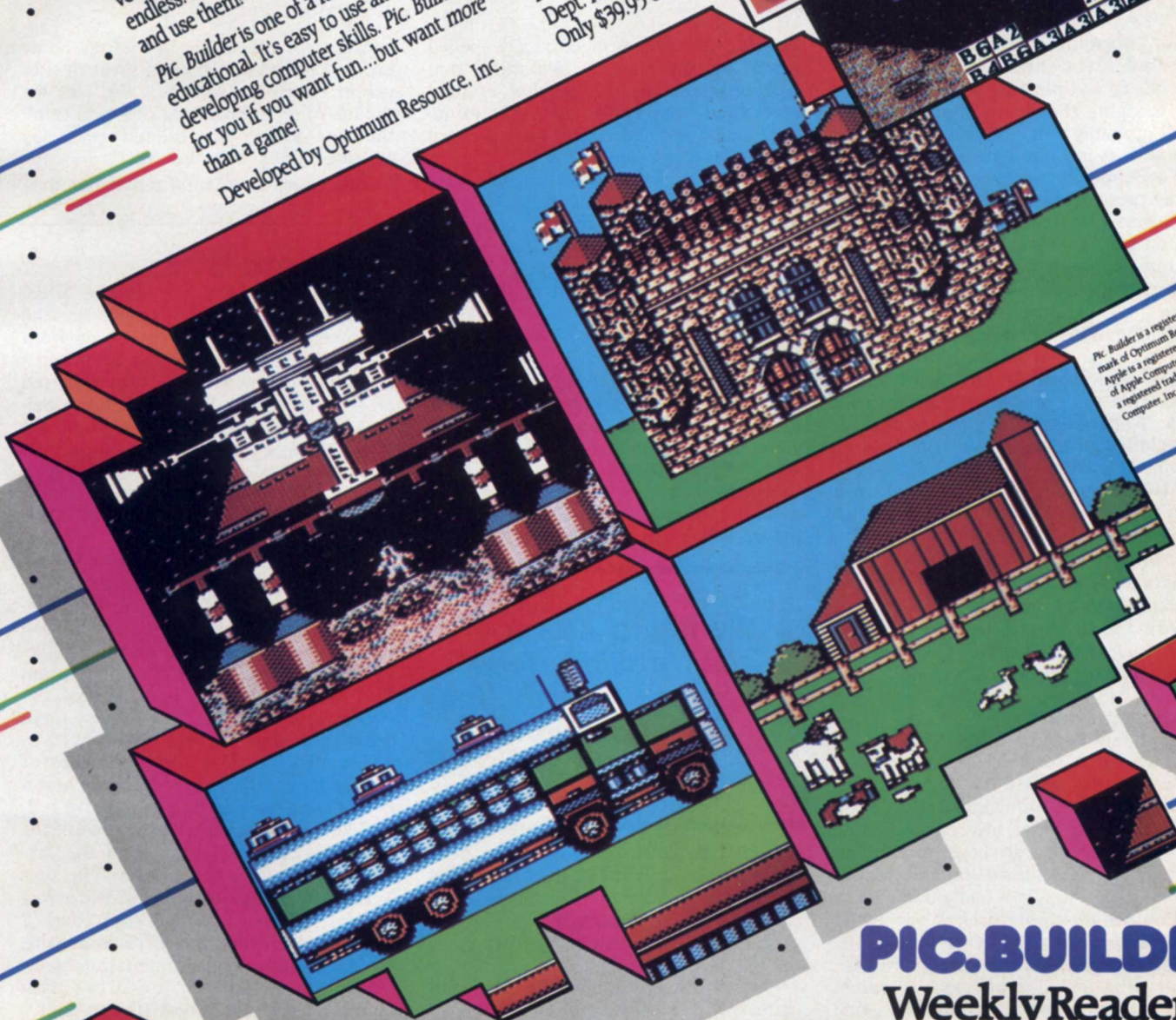
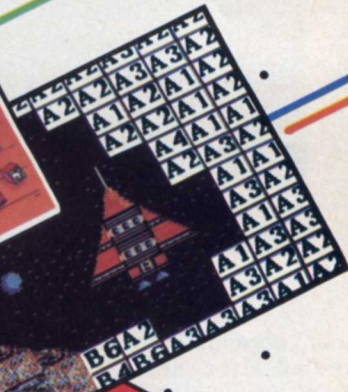
See how creative you can be with this unique picture-building program. You build color pictures with blocks, one block at a time — like a construction set.

You can build pictures of outer space, castles, farms, trains, trucks, and much more. Or, you can be even more creative and invent your own pictures. The possibilities are endless. Plus...you can save your pictures and use them!

Pic.Builder is one of a kind. It's creative. It's educational. It's easy to use and good for developing computer skills. Pic.Builder is for you if you want fun...but want more than a game!

Developed by Optimum Resource, Inc.

Designed by Richard Hefter, Steve Worthington and John Magdziarz. For Apple® and Atari® Computers with 48K and a disk drive. Look for Pic.Builder in computer stores everywhere. If they don't have it yet, ask for it. Or, you can order by calling toll free 1-800-852-5000, Dept. AF-3. Only \$39.95 each.

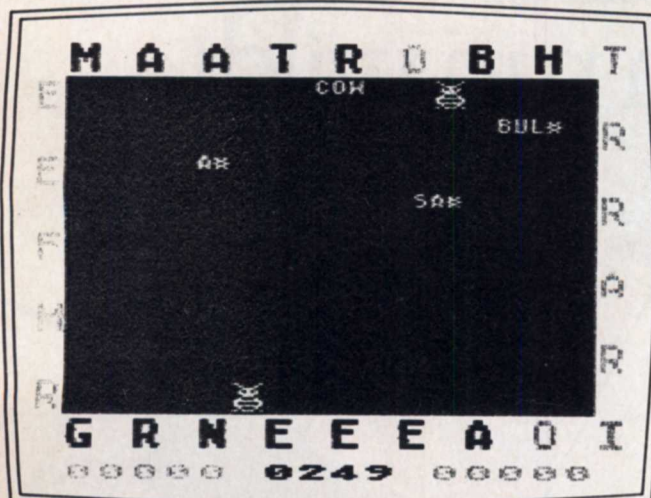


Pic.Builder is a registered trademark of Optimum Resource, Inc. Apple is a registered trademark of Apple Computer, Inc. Atari is a registered trademark of Atari Computer, Inc. AM59 AF3

PIC.BUILDER™
Weekly Reader
Family Software

A division of Xerox Education Publications
Middletown, CT 06457

CIRCLE 181 ON READER SERVICE CARD



Attack of the Spelling Bees

about two minutes, the correct spelling will flash a few times, giving you a few seconds to complete it. If you still don't get it right, the word disappears, but "will probably come back later to haunt you with even more letters missing."

You control your bee with the joystick, pressing the stick forward to go clockwise and back to move counter-clockwise. This takes some getting used to, but get used to it we did and were soon zooming around the screen.

As the game progresses, the difficulty gradually increases based on the number of correctly spelled words. More difficult games offer words of up to 15 letters with more than one letter missing from each. The speed of the game is also increased if you select the intermediate or advanced level of play.

At the beginning of each session, you specify the duration of the game (from 1 to 30 minutes), and scoring is based on the number of words completed with variations that are too complicated to explain here (a scoring table is provided). The five high scores are saved on disk along with the player's initials and updated at the end of each game.

Documentation

As mentioned above, we found this a difficult game to describe, and apparently the author faced the same problem when writing the documentation. You can get the general idea of the game from reading the six-page instruction leaflet, but it is not until you have played several games that you really understand it. You can then refer back to the leaflet for scoring details and other fine points.

The documentation is clear, however, about what and how it hopes to teach. The first paragraph states that the game "teaches spelling in two ways; directly, by requiring the player to fill in missing letters in words, and indirectly by im-

pressing the images of correctly spelled words on the player." We think that both of these objectives are met, and are exceedingly happy to note that at no time does an incorrectly spelled word appear on the screen.

The leaflet notes that the game disk contains 250 common words. There is no provision for adding your own words, but additional word lists for all grade levels and in various specialized categories are available at modest cost from the manufacturer.

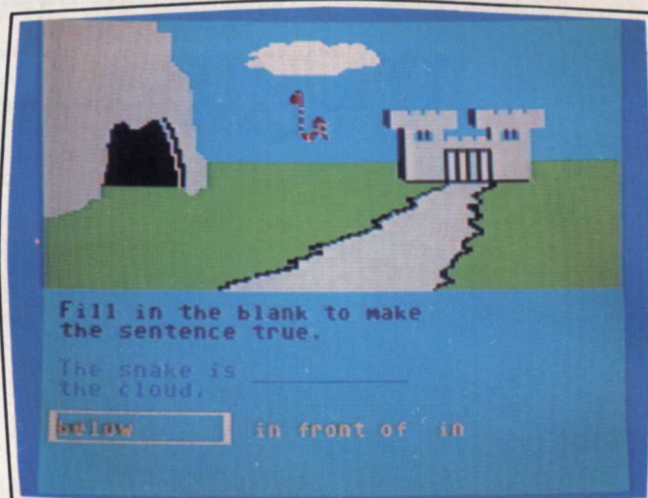
Summary

We found *Attack of the Spelling Bees* addictive in a way that few educational programs are. The concept is simple enough, but the challenge of figuring out first which letter to use and then successfully hitting the target with it make the game great fun. The two-player game can turn friends and col-

We found *Attack of the Spelling Bees* addictive in a way that few educational programs are.

leagues into cutthroat adversaries as it demands not only quick thinking to get a word before your opponent does but a certain amount of strategy as you use your bee to keep the enemy from using the letters he wants.

Our only suggestion for Jay Gee concerns the packaging of the program. We think that it would be well worth the small extra cost to provide an envelope for the disk. We think this is an excellent



The Word Bird

package for classroom as well as home use and one that will see a great deal of use in either environment. We fear for the life of an unprotected disk and think that for \$39.95 you should get a 5¢ envelope along with the disk.

CIRCLE 408 ON READER SERVICE CARD

The Word Bird

Moving from the bees to the birds, we examined a new package in the Discovery Reading Works series from International Publishing and Software, a Canadian company. The bird pictured on the box of *The Word Bird* has a balloon filled with prepositions—on, in, beside, above—coming out of its mouth. It reminded us of our high school German teacher stalking around the room chanting "an, auf, hinter, in, neben, über, unter..."

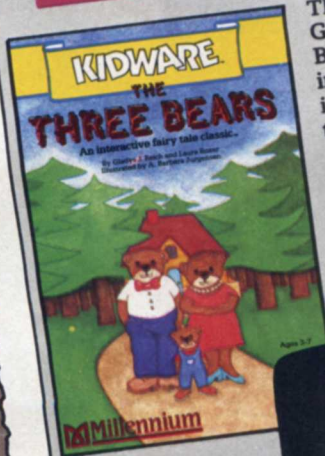
Yes, Fräulein Behrens had one way of teaching prepositions, and it was effective, but times have changed. Children learning about prepositions in English today have a far more pleasant vehicle. *The Word Bird* is a delightful program that "focuses on the relationships between objects in space and the way these are described in English."

The disk includes three activities of increasing complexity which are chosen from the title screen by pressing the 1, 2, or 3 key. All other action required of the player is executed either with the joystick or a strange set of keys. The keyboard control combination of left arrow (down), CTRL (left), 1 (up), and 2 (right), which did not correspond with the diagram in the documentation booklet, is one of the least logical we have seen, and we found that players had a much easier time with and preferred to use the joystick.

After a short practice session in which

Kidware™ - For Today's Child

And the 21st Century Grown-up



The classic fairy-tale of Goldilocks and the Three Bears comes to life in new interactive form. The graphics are bold and bright and the story unfolds as your child directs. Like a picture book, a tale for you and your child to read and share together. By Gladys J. Reich and Laura Boxer. Illustrated by A. Barbara Jurgensen. Ages 3-7. \$39.95.

The Three Bears



Today's child will live most of his or her life in the next century.

Now Millennium™ Kidware helps prepare young children for their future. Every program stimulates the mind and unlocks the imagination in a way never before possible—the computer guides, but the child chooses. That means learning becomes fun and spirits soar.

Every Kidware program has been designed by experts (we tell you who

For the Apple IIe and II+. Coming soon for IBM. Copyright © 1984 Millennium Group Incorporated. Apple IIe and II+ are trademarks of Apple Computer, Inc. IBM is a trademark of International Business Machines Corp.

Ask for these Millennium products at your local dealer.

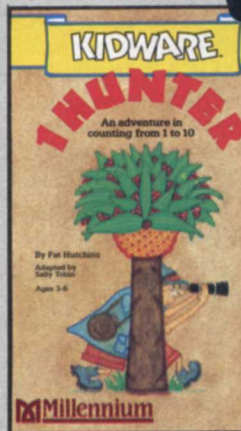
Concentration



A challenging memory testing and building game for the entire family. Five separate games—balloon, child, flag matching for the youngest child, and Morse code for the hardest Concentration ever. And with varying levels of difficulty, everyone can play. By Gladys J. Reich, Laura Boxer, and Ronald S. Lizzi. Ages 5-adult. \$34.95.



1 Hunter



Journey through a wondrous jungle with 1 Hunter, past colorful and playful animals, counting them as the Hunter goes. And when the story is complete, the program becomes a new counting game, reinforcing learned skills. This is the first program drawn from a book by Pat Hutchins, the well-loved Kate Greenaway Medal recipient, and is remarkably true to her style. Adapted by Sally Tobin. Ages 3-6. \$34.95.

they are on the cover), and tested by their toughest critics—kids. Every program comes with a straightforward guide to its educational benefits and suggestions for discussion between child and grown-up. And every program builds on the best of the past and present...to bring you the future.

Millennium™

A New Age in Mind
24 East 22nd Street, New York, New York 10010
(212) 674-0040

CONNECT NOW!

PROMETHEUS
PRODUCTS INCORPORATED

Hayes

212A Modem Comparison Chart *

Together, these standard and optional features give you a sophisticated electronic mail and communications capability unmatched by any other modem in this class. And, there's more. See your local dealer for additional information and a demonstration. He'll show you why ProModem 1200 is tops.

* ProCom Software

12-character Alphanumeric Display

[illegible]

you master the technique of moving a rectangular frame around on the screen and positioning it over a word to indicate a choice, you begin with Activity 1 which asks you to compare a sentence to a picture on the screen and tell whether the sentence is true or not. You may see a picture of a castle with a road leading up to it. As you watch, a snake moves across the screen and stops alongside the road. The sentence under the picture reads "The road is to the right of the snake." You use the joystick to move the frame over the word "yes" or "no" to indicate your answer.

During play, the program selects randomly from a pool of five prepositions. When you have answered correctly with a given preposition three times, that word is removed from the pool and another is substituted. A total of 12 prepositions is drilled in Activity 1. The activity ends with a screen that reports the number of correct answers out of the number of attempts. The program then cycles back to the title screen to allow you to choose one of the other activities.

In Activity 2, a picture is presented. Then an additional object floats across the screen, coming to rest near something in the picture. You read the sen-

The Word Bird is a unique program that drills several valuable skills at once.

tence below and decide which of two or three prepositions when inserted into the sentence will make it correct. For example, you may see an outdoor scene with a bird peeking out of a mailbox. You must then decide whether "inside" or "on top of" makes the sentence "The bird is _____ the mailbox" describe the picture. You must get each preposition right five times in a row to advance in Activity 2.

When you choose a correct answer in either of the first two activities, you hear a pleasant tune. A pencil then appears in the lower right corner of the screen and draws a red check mark. Finally, the message "That's right!" appears under the sentence. Incorrect responses evoke a "raspberry" sound, and the pencil draws an X. A sentence of explanation then appears on the screen.

Activity 3 asks you to make your own sentences. A picture is presented along with a skeleton sentence containing three blanks. Beneath each of the blanks are two words or sets of words that can

SOFTWARE PROFILE

Name: The Word Bird

Type: Educational game

Suggested Age: 6 to 12

Author: Jill Golick

System: 32K Atari, Commodore 64

Format: Disk

Summary: A superb way to practice reading and spatial relationships.

Price: \$29.95

Manufacturer:

International Publishing &
Software Inc.
3948 Chesswood Dr.
Downsview, ON
Canada M3J 2W6
(416) 636-9404

Distributor:

Gladstone Electronics Inc.
1585 Kenmore Ave.
Buffalo, NY 14217
(716) 874-5510

be used to complete the sentence. You choose one from each pair and watch as the scene ("The boat is on top of the bird," for example) is created on the screen. We found that the sillier the sentences, the more our playtesters enjoyed the game.

Documentation

The eight-page instruction booklet is a model of completeness. It begins by describing the rationale for learning the skills presented in the game: "Although our world is three-dimensional, we usually use only two dimensions to represent it... and to understand geometry,

trigonometry, and geography, children must be able to recognize spatial relationships."

The next section describes the use of the joystick and control keys, and instructions for loading the program to follow. Unfortunately, there is a typographical error in the loading instructions for the Commodore 64, so a strip of paper detailing the correct command is inserted in the package. Although it is a standard command, this is a bad sort of error to find in an instruction manual.

The activities are described in a page and a half, followed by a page of suggestions for reinforcing the skills practiced in the activities—both with the computer and without. On the last page of the booklet we find a set of educational objectives that would satisfy any education professor. And we think that the program does an excellent job of satisfying those objectives.

Summary

The Word Bird is a unique program that drills several valuable skills at once. It teaches spatial relationships while encouraging the young reader to read carefully (even our adult players made errors when they overlooked the word "not" in some of the sentences or failed to concentrate on word order).

The graphics are colorful and clever, and the vocabulary is varied enough to assure that children will not soon tire of it.

Our only complaints concern the two typos (loading instructions and control keys) in the manual. These can be corrected easily, and we hope they will be in subsequent editions of the program.

The Word Bird is a truly superb example of what educational software can be. We recommend it highly. 33

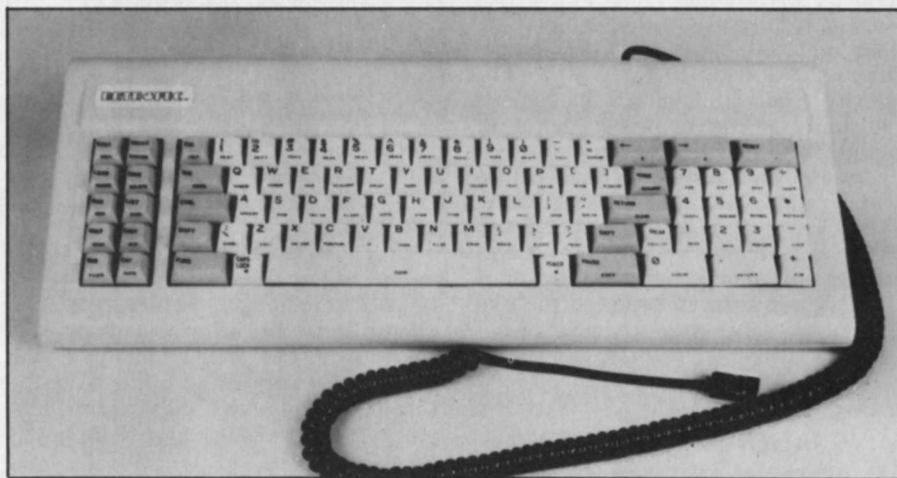
CIRCLE 409 ON READER SERVICE CARD



What's New In Hardware

Detachable Keyboard for Apple

Data Spec has released a detached extension keyboard for the Apple II/II+. The keyboard features a full ASCII character set with upper- and lowercase. To simplify computer use, the keyboard has a total of 97 pre-programmed functions and commands, 20 of which are located on a separate keypad for easy access. All four mathematical functions are found next to a ten-key numeric keypad. In addition, key words such as FOR, NEXT, and PRINT; and operating system commands such as DIR, PIP, TYPE, and STAT; and other key words used in programming are included.



The Data Spec keyboard includes a ten-foot coiled cable for accessibility and freedom of movement. The suggested list price is \$299.95.

Alliance Research Corporation, 18215 Parthenia St., Northridge, CA 91325. (818) 701-5848.

CIRCLE 410 ON READER SERVICE CARD

Modem and Winchester for Mac

Tecmar has implemented a telephone/modem subsystem for Macintosh and other computers with RS-232 serial ports that provides an easy-to-use, low cost, full-featured telephone and modem interface. It can be used as a standard telephone

TECMAR

with a handset or be connected to a telephone.

The product is a 300/1200 baud (212 A compatible) modem with touch-tone decoding, pulse/tone automatic dialer, and a full voice interface. It can be used to enter data or commands remotely through the standard keypad of a telephone.

Called Apple Fritter, the peripheral,

when configured for the Applebus, is part of Tecmar's Candy Apple line of interfaces for Macintosh and other Applebus peripherals.

Macintosh 5 MByte Cartridge Winchester

Also for the Macintosh is Tecmar's 5Mb Removable Cartridge Winchester Subsystem called The Mac Drive.

The Removable Cartridge Winchester combines the mass storage and speed of conventional Winchester with the removability, transportability, and flexibility of a floppy. Tecmar has interfaced the removable cartridge Winchester to the Applebus for use with Macintosh. It is provided in an enclosure that fits the Macintosh style and color.

Tecmar, Inc., 6225 Cochran Rd., Solon, OH 44139. (216) 349-0600.

CIRCLE 411 ON READER SERVICE CARD

Apple Software Runs on IBM

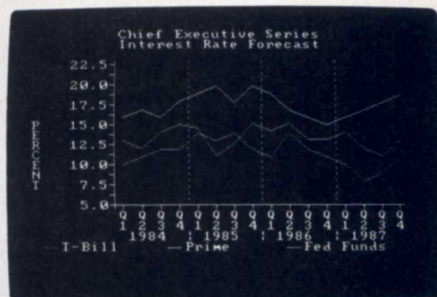
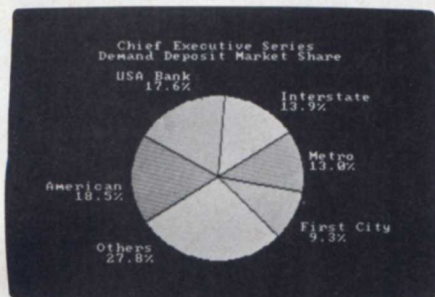
The Diamond 3 is a plug-in board that lets users of the IBM PC run both Apple and CP/M programs.

Developed by Diamond Computer Systems, the Diamond 3 is a sophisticated microcomputer. It has three processors, a Z80A for CP/M, a 6502B for Apple mode, and a separate 6502B display controller with software that improves on the quality of Apple II screen output through interface scanning.

The Diamond 3 is available, at a suggested retail price of \$695.

Diamond Computer Systems, Inc., 3380 Montgomery St., Santa Clara, CA 95050. (408) 986-0100.

CIRCLE 412 ON READER SERVICE CARD



Educational computer games that make you the C.E.O.

The Chief Executive Series is an exciting new concept in entertainment. Each game in the Series makes you the Chief Executive Officer of a company in a different industry. You make the decisions that are the key to success or failure. The quality of your decisions determines how well your company does against its competitors.

As you manage your company, you get vital information about the business environment, competitors, and your own performance, displayed in easy-to-understand bar charts, pie charts and graphs. You can play alone, against the computer, or in competition with others.

Chief Executive Series games are as educational as they are entertaining — an ideal way to learn the fundamentals of strategy and decision making in each of the industries represented. Every game gives you an authentic and realistic management challenge.

Chief Executive Series games are available for IBM and Apple computers. They will thoroughly test and sharpen your management skills.

BANK PRESIDENT You are president of a large commercial bank. You must plan your strategy and make all the important decisions involved in running your financial empire. Set loan and deposit interest rates, raise or lower employee salaries, issue and redeem stocks and bonds, and manage your investment portfolio.

HIGH-TECH ENTREPRENEUR Start and build a high-tech manufacturing company. You must organize a competent management team, raise venture capital, and successfully develop and market your products. To succeed, you have to develop good management skills and the ability to allocate limited resources.

VENTURE CAPITALIST Compete with other venture capitalists for funds and for the best investment opportunities. Evaluate business plans and decide when and on what terms to invest. Provide seed money for start-ups or finance more established companies. An excellent way to learn more about the exciting venture capital world.

Call Lewis Lee for the name of the dealer nearest you. 1-800-842-9900

LewisLee™
CORPORATION

P.O. Box 51831 • Palo Alto, CA 94303 • (415) 853-1220

CIRCLE 141 ON READER SERVICE CARD

Chief Executive, Bank President, High-Tech Entrepreneur, Venture Capitalist, and Lewis Lee are trademarks of Lewis Lee Corporation.

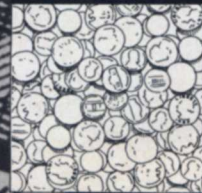
IBM is a registered trademark of IBM Corporation.

Apple is a registered trademark of Apple Computer Inc.

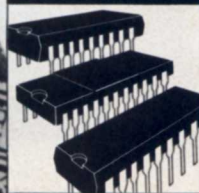
© 1983 Lewis Lee Corporation

CHIEF EXECUTIVE™ SERIES
BANK PRESIDENT™

VENTURE
CAPITALIST™



HIGH TECH
ENTREPRENEUR™



Amdek Daisywheel Printers

Three new letter quality printers, the 5000 series, for home, office, and other commercial environments have been introduced by Amdek Corporation.

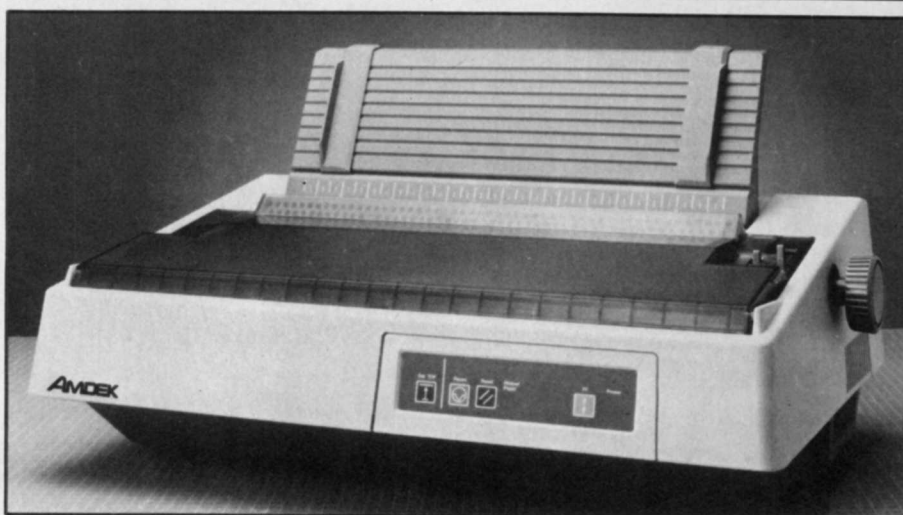
The Amdek 5000 series includes:

- The Amdek 5025, a transportable, 25 cps printer.
- The Amdek 5040, a desktop, 40 cps printer.
- The Amdek 5055, a desktop, 55 cps printer.

The 5000 series printers are ruggedly built and operate at a low, 50 dba noise level.

The printers have built-in Centronics parallel and RS-232 serial interfaces allowing the units to be compatible with a wide range of computers.

The printers have a wide paper carriage to handle 132-column forms for spread-



sheet applications and use a newly designed daisywheel that provides up to 125 characters per wheel.

Each printer is shipped with a daisy-wheel, ribbon cassette cartridge, parallel interface cable, paper guide, and full documentation.

The suggested retail price of the Amdek 5025 is \$799; the Amdek 5040, \$1675; and the Amdek 5055, \$1990.

Amdek Corporation, Printer Products, 2201 Lively Blvd., Elk Grove Village, IL 60007. (312) 364-1180.

CIRCLE 413 ON READER SERVICE CARD

Music Cards for Apple

ALF music cards for the Apple are now available with new software. Both the nine-voice Music Card MC1 (\$169) and the three-voice Music Card MC16 (\$179) now have extensive editing functions

which make it even easier for novices to enter songs and play them back. The user can create music without having to learn to play an instrument by matching the symbols in regular sheet music with those on the screen.

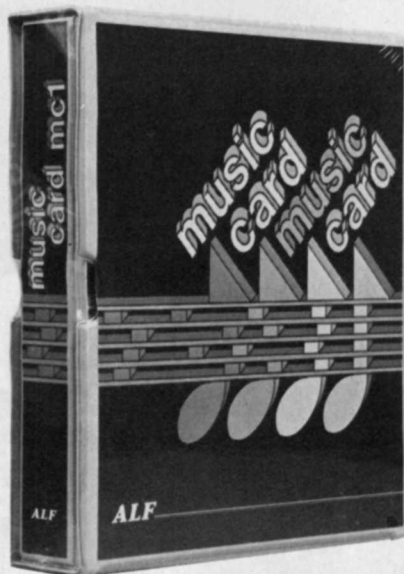
New playback routines allow the tempo to be changed at any point and allow several songs to be played in sequence. A program for experimenting with sound

envelopes and creating loudness contours is now included.

The MC1 and MC16 cards can be used on the Apple II/II+ and Apple-compatible computers. Present MC1 and MC16 owners can obtain upgrades at a nominal cost.

ALF Products Inc., 1315-F Nelson St., Denver, CO 80215. (303) 234-0781.

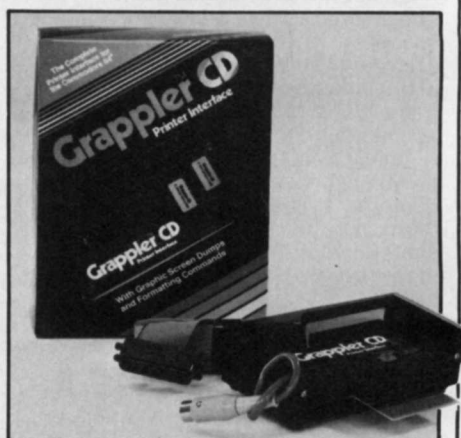
CIRCLE 414 ON READER SERVICE CARD



Intelligent Printer Interface for C-64

Orange Micro, Inc. announces the Grappler CD intelligent printer interface for the Commodore 64. Featuring four different operating modes, the Grappler CD is the most complete interface available. The Grappler CD contains a Commodore 1525 Emulation Mode which causes the printer to create characters as they would appear on the C-1525 printer. This means graphics and special characters can now be printed by Epson, Star, Okidata, Prowriter, NEC, and other dot matrix printers. It also provides universal software compatibility, as most Commodore programs will send C-1525 codes.

The screen dump routines allow the printing of hi-res and block graphics with a variety of options. Double size, inverted, rotated, and emphasized graphics are ac-



cessible via simple commands.

The Grappler CD comes in a sturdy housing with all required cables included. Power is drawn from the expansion port to eliminate extra wiring.

Orange Micro, Inc. 1400 N. Lakeview, Anaheim, CA 92807. (714) 779-2772.

CIRCLE 415 ON READER SERVICE CARD

Take the 6-volume Microcom

This \$86.70 value is yours for \$2.95 as a member

You simply agree to buy 3 more books—at handsome discounts—within the next 12 months.

1 BASIC and the Personal Computer.

Dwyer and Critchfield. Here's a down-to-earth guide that shows you how you can begin programming in the BASIC language (and extended BASIC) in only eight hours. The authors take you step-by-step through the world of personal computing, showing you how to get the most out of simple computer graphics, accessing data bases, and word processing.

The book shows how to make use of BASIC in simple tasks like computerizing your record library...putting together a management information system...and sorting operations. The examples and numerous illustrations make this an ideal introduction to the wide range of applications possible with personal computers. **Publisher's Price: \$15.95.**



2 Executive Computing: How To Get It Done on Your Own.

John Nevison. This outstanding reference contains 25 business methods illustrated with working computer programs. You'll see how to establish price alternatives for different products...how to graph actual and projected sales...how to estimate cash flow...and how to develop long-range planning. The author shows you how to build up a corporate data base...how to compute present and future value...how to handle project planning, scheduling, and control.

Learn how to handle sales forecasting and decision analysis, linear programming and inventory modeling. With this handy guide, businessmen will be able to apply their small computers to a wide range of complex decision-making tasks. **Publisher's Price: \$12.45.**

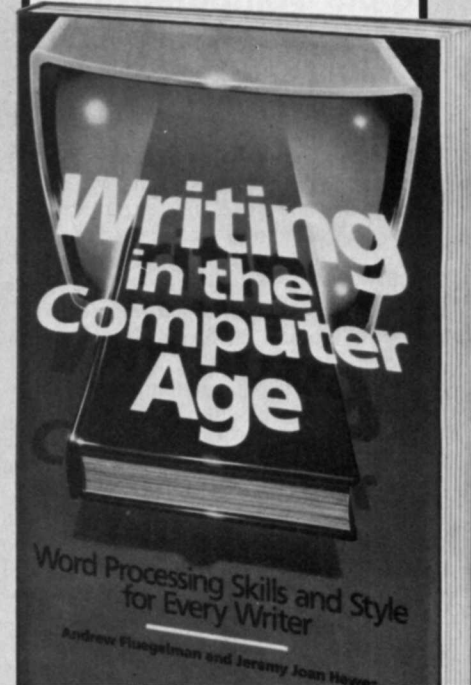
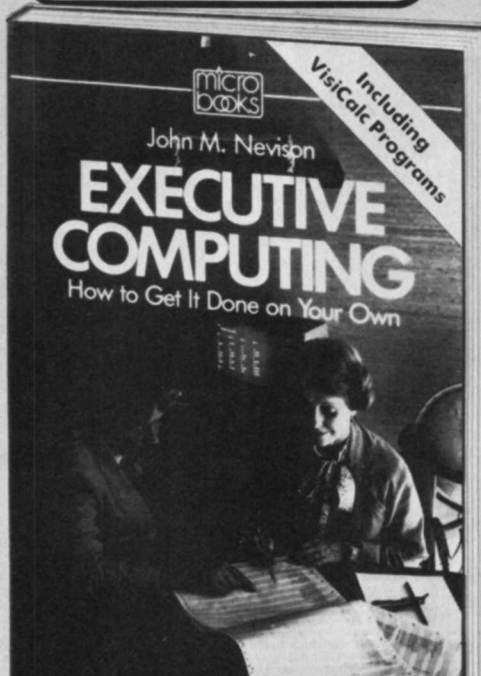
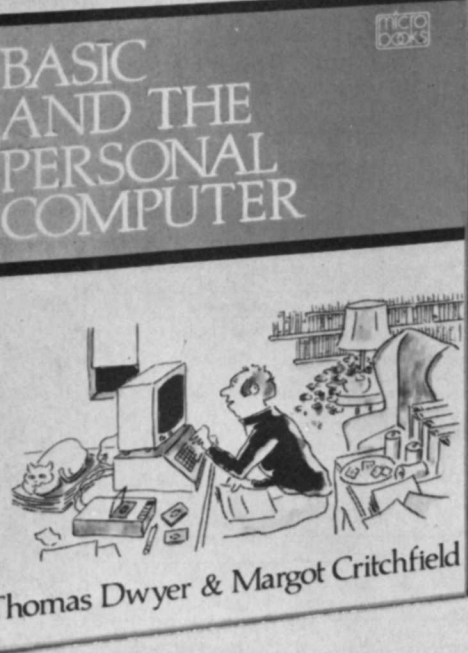
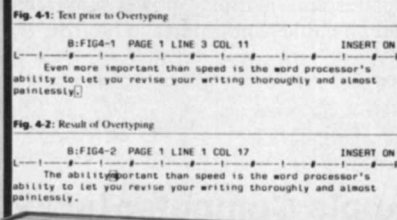
	A	B	C	D	E	F
1	GROWTH RT	1.83	1.15		1.12	
2						
3	YEAR	NAT	LABOR TOTAL	CST	PRICE	MARGIN(%)
4	0.00	56.00	21.00	77.00	100.00	23.00
5	1.00	57.60	24.15	81.83	112.00	26.94
6	2.00	59.41	27.77	87.18	125.44	30.50
7	3.00	61.19	31.94	93.13	140.49	33.71
8	4.00	63.83	36.73	99.76	157.35	36.60
9	5.00	64.92	42.24	107.16	176.23	39.20
10						

3 Writing in the Computer Age: Word Processing Skills and Style for Every Writer.

Fluegelman and Hewes. A step-by-step manual that covers everything from the type of hardware best suited to your purposes to the fine points of formatting the finished work. Including:

- hardware—a run-down on system components...selecting a keyboard to suit you...the right screen
- software—evaluates word processors and word processing programs...how to boot the operating system and format disks
- how to set up, organize, and maintain your electronic file system
- styles and strategies for writing
- techniques for editing and polishing your work
- screen and print formatting—how to get your work in exactly the form you want.

Learn everything from moving the cursor to allocating disk space for data base research. **Publisher's Price: \$10.95.**



puting Library for only \$2.95!

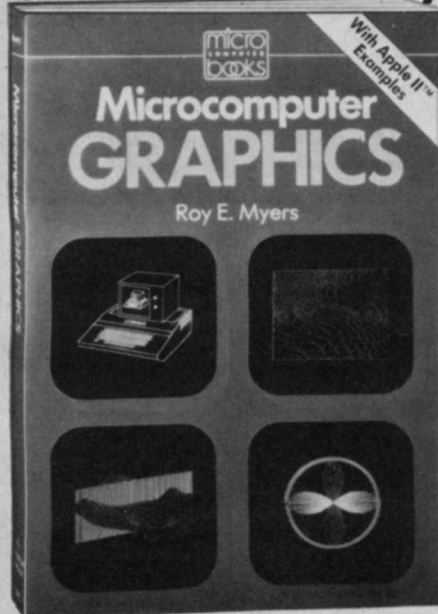
of the Small Computer Book Club.

4 Microcomputer Graphics.

Roy E. Myers. This sophisticated computer graphics book for BASIC programmers provides the essential mathematics and programming techniques you will need for computer graphics applications.

The programs are written in Apple-soft BASIC, but many are adaptable to other languages and microcomputers. This excellent guide shows you more than 80 ready-to-use BASIC programs which illustrate basic graphics concepts...shows you how to create your own graphics...includes techniques for generating three-dimensional graphics in two dimensions...shows you hidden line and surface routines...introduces animation techniques...and shows you how to handle image rotation and translation.

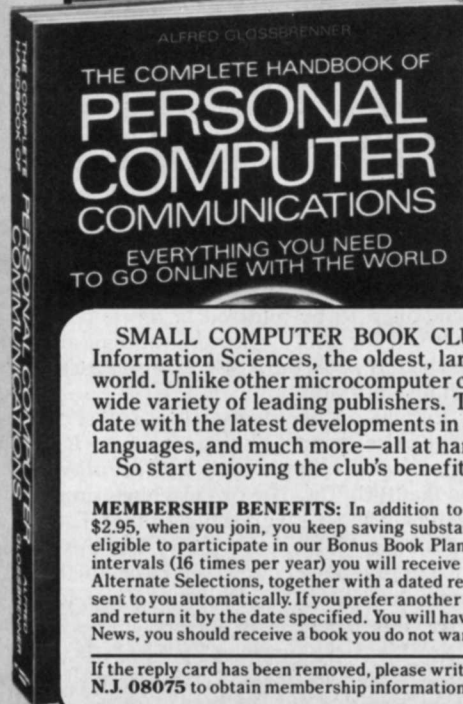
It includes an overview of all the system components needed to do graphics work. **Publisher's Price: \$12.45.**



5 The Complete Handbook of Personal Computer Communications.

Alfred Glossbrenner. Here is a remarkable collection of detailed information on the far-flung aspects of computer networking and data bases—*information for which the average person would have to spend at least a year and probably more than a thousand dollars.* You'll find thousands of ways you can use your personal computer to find specialized business information...do shopping and banking at home...and more.

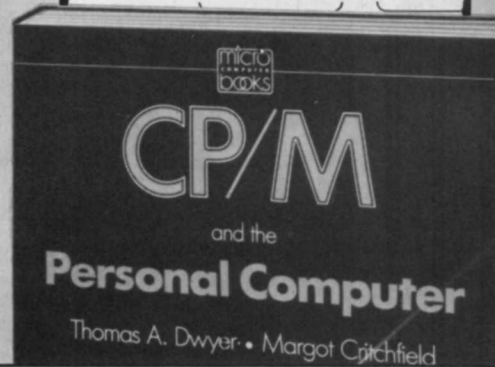
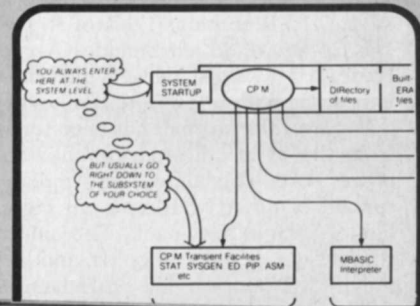
The book points out the hardware you will need, and covers such important topics and services as time-sharing networks...direct and acoustical connections...modems...what to look for when selecting communications software...and how to use the specialized data bases, such as Newsnet and Comp-U-Store which are already available. **Publisher's Price: \$14.95.**



6 CP/M and the Personal Computer.

Dwyer and Critchfield. The authors of this outstanding guide show you how to get the most from CP/M...how to use the basic system commands that will allow you to manage disk storage...debug other programs...move programs and data from one location to another...cold and warm booting...formatting blank disks...how CP/M itself is organized.

The authors also tell you how to deal with just those areas which the CP/M manuals fail to explain well, including the three main command modules of CP/M...the seven built-in commands...nine transient commands...the six principal control characters. Then they show how to use the typical features of software packages that run under CP/M, including word processing...business accounting systems...data base management systems...electronic spread sheets/plotting/predicting packages...and much more. **Publisher's Price: \$19.95.**



SMALL COMPUTER BOOK CLUB is a division of the Library of Computer and Information Sciences, the oldest, largest and most respected computer book club in the world. Unlike other microcomputer clubs, Small Computer Book Club offers books from a wide variety of leading publishers. The Small Computer Book Club will keep you up-to-date with the latest developments in software, improvements in hardware, programming languages, and much more—all at handsome discounts.

So start enjoying the club's benefits today.

MEMBERSHIP BENEFITS: In addition to getting the 6-volume MICROCOMPUTING LIBRARY for only \$2.95, when you join, you keep saving substantially on the books you buy. Also, you will immediately become eligible to participate in our Bonus Book Plan, with savings up to 70% off the publishers' prices. At 3-4 week intervals (16 times per year) you will receive the Book Club News, describing the coming Main Selection and Alternate Selections, together with a dated reply card. If you want the Main Selection, do nothing and it will be sent to you automatically. If you prefer another selection, or no book at all, simply indicate your choice on the card, and return it by the date specified. You will have at least 10 days to decide. If, because of late mail delivery of the News, you should receive a book you do not want, we guarantee return postage.

If the reply card has been removed, please write to the Small Computer Book Club, Dept. Y-AG3, Riverside, N.J. 08075 to obtain membership information and an application.

Creative Computing 7/84

Apple II Forever?

Apple Announces the IIC

On April 24, 1984 Apple Computer made an earthshaking announcement: the Apple IIC. The Moscone Center in San Francisco shook for nearly three minutes with the force of 6.2 on the Richter scale. The occasion for the announcement was a combined dealer/sales convention for Apple. The theme of the convention was "Apple II Forever," which neatly summarizes Apple's long range strategic plan for the Apple II.

The Apple IIC contains a 65C02 CPU operating at 1.02 MHz—essentially a low heat version of the processor used in all Apple IIs. It contains 128K of RAM and 16K of ROM, which includes Applesoft Basic. A 5 1/4" disk drive is built into the unit along with a full-function keyboard. The power transformer has been removed from the main unit and attached to the power cord. This allows the Apple IIC to run off of an AC outlet, a car cigarette lighter, or a battery pack. The unit has a slim design, is ivory in color, and weighs only 7 1/2 pounds. The little handle on the back is most useful for propping the unit up for a proper keyboard angle. It is only marginally useful for toting the unit since you also need to tote the power cord, disks, and the RF modulator in hopes of tracking down a TV set to plug into.

The rear panel contains a potpourri of sockets which lets the Apple IIC neatly communicate with the outside world. There are sockets for a display screen, a printer, a modem, a mouse, a joystick, and a second floppy disk drive. In keeping with Apple's international outlook, each socket is labelled with an icon which identifies the function of the socket. A built-in speaker allows five octaves of sound.

The Apple IIC offers three graphics modes: 16-color low resolution (40 by 48), six-color high resolution (280 by 192), and monochrome ultra-high resolution (560 by 192).

The keyboard is really nice. The keys are full-stroke and have an audible click. Upper- and lowercase are available, and there is a tiny switch at the top of the key-

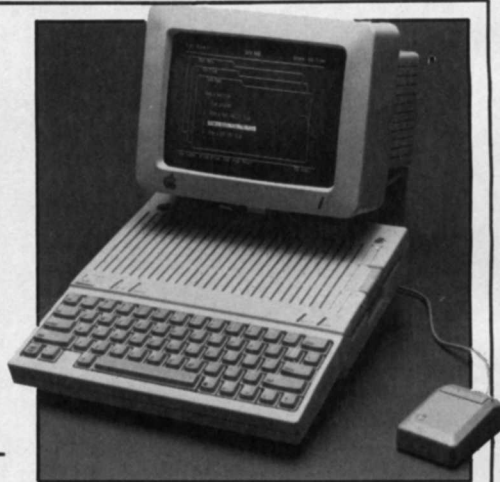
George A. Miller

board to allow you to switch from 40 columns to 80 columns. Next to that switch is another one used to change the keyboard from QWERTY to Dvorak. On the international versions of the Apple IIC the keyboard switch will allow instant flip from your country keyboard layout to American.

The Apple IIC sells for \$1295. Accessories include a printer, mouse, monitor, monitor stand, carrying case, second power pack, and disk drive. The printer is called the Apple Scribe thermal-transfer printer. It costs \$299 and is capable of high-quality text and graphics in black and white or color. If you get the color ribbon, you can print in cyan, magenta, and yellow. By careful control of adjacent colors you can create combinations of these colors. Clever software should permit a whole rainbow of output.

The mouse sells for \$99 and is the same mouse as comes with the Macintosh. In fact, free with your purchase of the mouse is a program called *Mousepaint*, which bears a strong resemblance to MacPaint. The monitor is a very small, green phosphor screen which sells for \$199; the stand for \$39. The carrying case costs \$39, and the external drive, \$329. Apple's Imagewriter can also be connected to the IIC. Perhaps most interesting was the announcement of a future accessory called the flat display. This is a full 80-column by 24-row, low power LCD display is scheduled to be released in the fall and will sell for \$600. With this display and the battery pack, the Apple IIC may actually achieve portability.

Enough of the facts. Now for some editorial comment and speculation: It is clear that the Apple IIC is a direct attack on the IBM PCjr. The two machines sitting side-by-side look very much alike. They both have 128K memory, one disk drive, an external power pack, and basically the same back panel of sockets. They are



basically the same price, and both claim heritage of their family line of software. The keyboard on the Apple IIC is much better than the IBM PCjr. The CPU on the PCjr is much larger and faster than the one on the Apple. The Apple IIC will be able to run on a battery; the IBM PCjr was not designed to be battery driven. You can attach a mouse to either. The IBM PCjr allows bus expansion out the side and ROM cartridges in the front. This war will have no clear winner. Apple fans will buy the Apple IIC, and IBM fans will buy the PCjr.

I believe the Apple II will live forever. There is enough momentum to let it coast to the age at which it will become a museum piece. The Apple IIC has got to be the final transmutation of the Apple II for the following reasons: The Apple II requires a 5 1/4" disk drive for compatibility with its base of 10,000 programs. The Apple IIC is about as small a package one can design with a full-function keyboard and a 5 1/4" disk drive.

Apple has staked out a very bright future with its Lisa/Macintosh and will start devoting more of its energies to the 68000 chip and the 3 1/2" disk drive. The Macintosh is a revolutionary machine. The Apple IIC is evolutionary and the final (I believe) installment in the Apple II line.

Apple claims that 90 percent of the 10,000 Apple II programs will run on the Apple IIC. 10,000 programs should not be sneezed at; however, how many of them are really useful? Software becomes obsolete, just as hardware does. You can use only one word processor at a time, yet there are dozens for the Apple II. The newest wrinkle in "user-friendliness" is the mouse. How many of these 10,000 programs use the mouse?

These observations notwithstanding, Apple has made a very strong move with the Apple IIC and its marketing of it. I am convinced of the long term viability of Apple as the computer company of choice.

CIRCLE 418 ON READER SERVICE CARD

What made over 100,000 Apple II owners fall in love with System Saver?

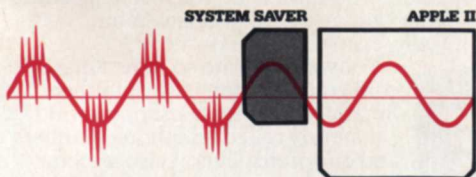
It's the most versatile, most convenient, most useful peripheral ever made for the Apple.*

System Saver® filters out damaging AC line noise and power surges.

70-90% of all microcomputer malfunctions can be traced to power line problems*. Problems your System Saver guards against.

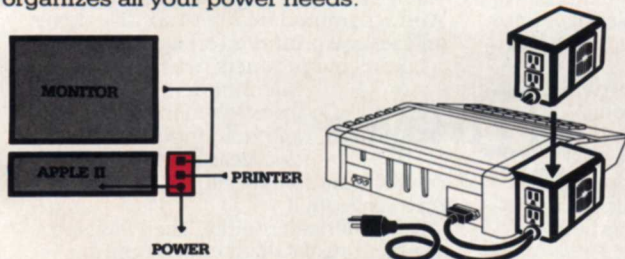
Power line noise can often be interpreted as data. This confuses your computer and produces system errors. Power surges and spikes can cause severe damage to your Apple's delicate circuitry and lead to costly servicing.

System Saver clips surges and spikes at a 130 Volts RMS/175 Volts dc level. A PI type filter attenuates common and transverse mode noise by a minimum of 30 dB from 600 kHz to 20 mHz with a maximum attenuation of 50 dB. You end up with an Apple that's more accurate, more efficient and more reliable.



System Saver makes your Apple more convenient to use.

No more reaching around to the back of your Apple to turn it on. No more fumbling for outlets and cords to plug in your monitor and printer. System Saver organizes all your power needs.

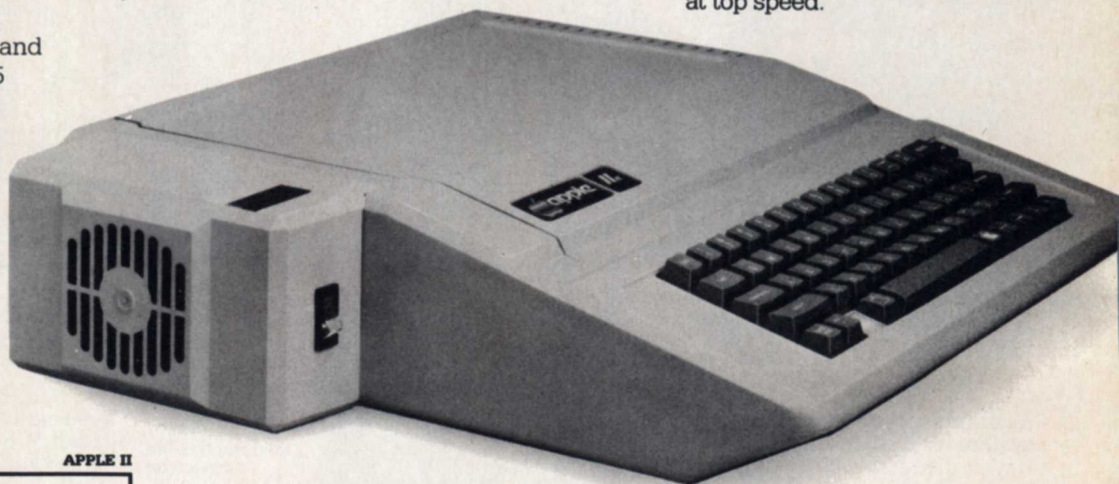
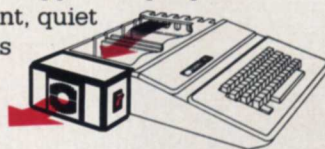


It functions as a multi-outlet power strip with two switched outlets. Plus System Saver offers the ultimate convenience; a front mounted power switch for fingertip control of your entire system.

System Saver lets your Apple keep its cool.

Today's advanced peripheral cards generate heat. In addition, the cards block any natural air flow through the Apple IIe creating high temperature conditions that shorten the life of the Apple and peripheral cards.

System Saver's efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots. It leaves your Apple cool, calm and running at top speed.



So if you want to keep damaging heat, line noise and power surges out of your system for good, pick up the only peripheral that's in use every second your computer is in use. The System Saver. You'll soon come to think of it as the piece Apple forgot.

Compatible with Apple stand



Please send _____ SYSTEM SAVER(S), \$89.95 each. Total \$_____

Include \$2.50 for shipping and handling.
New York State residents add applicable sales tax.

☐ Check enclosed ☐ Visa ☐ Master Card

Card No. _____ Expires _____

Name on Card _____

Name _____

Address (UPS delivery) _____

City _____ State _____ Zip _____ Phone _____

251 Park Avenue South
New York, NY 10010
(212) 475-5200 Tlx: 467383 KML NY

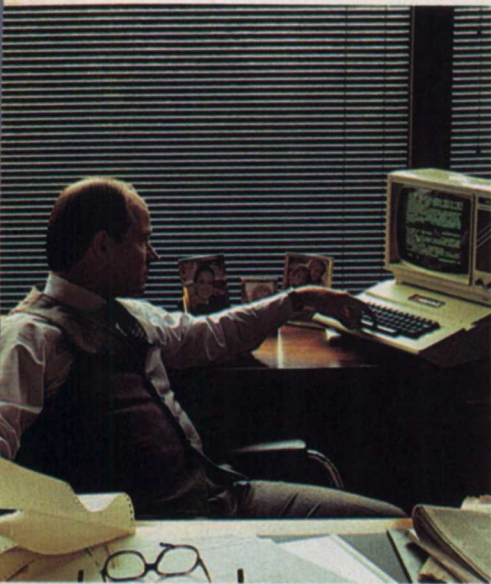


*PC Magazine: March 1983.

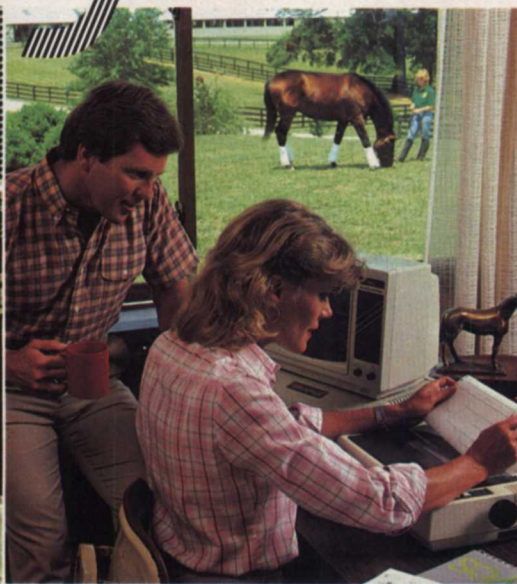
System Saver is UL Listed. System Saver's surge suppression circuitry conforms to IEEE specification 507 1980, Category A. Available in 220/240 Volts, 50/60 Hz.

System Saver is a registered trademark of Kensington Microware Ltd.
© 1984 Kensington Microware Ltd. System Saver is patent pending.

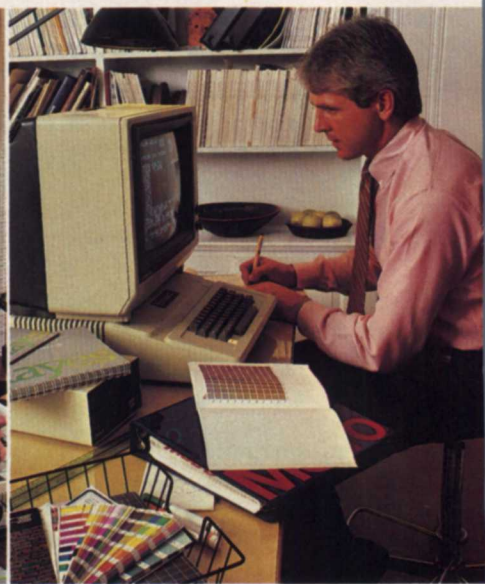
HayesTM Your Apple's telephone.



"Thanks for the prompt reply. Sure was a lot faster than waiting for the mail!"



"Gary: The pedigrees for next week's auction are as follows..."



"Attn. Prod., Sales, Purch.: Recommend 50% blue, 30% red screen for closest match!"

A complete plug-in communications system for Apple[®] computers. From Hayes, the established telecomputing leader: the simple but sophisticated Micromodem II[®] plug-in board and its companion software, Smartcom I.TM Everything you need to expand the world of your Apple II, IIe, II Plus and Apple III. In one, convenient communications package.

With Micromodem IIe and Smartcom I, you can access data bases, bulletin boards, and the varied resources of information services. Plan your travel itinerary via computer, including flight numbers, hotel and rental car reservations. Retrieve and analyze daily stock and options prices. Work at home and send reports to your office. You can even do your gift shopping by computer!

Micromodem IIe. Think of it as your Apple's telephone. It allows your computer to communicate with any Bell-103 type modem over ordinary telephone lines, at 110 or 300 bits per second. Micromodem IIe installs easily in an expansion slot, and requires no outside power source. It connects directly to either a single or multiline modular phone jack, to perform both Touch-Tone[®] and pulse dialing.

Micromodem IIe dials, answers and disconnects calls automatically. And, unlike some modems, it operates in full or half duplex, for compatibility with most time-sharing systems.

A built-in speaker lets you monitor your



calls when dialing. That way, you'll know if a line is busy. With Smartcom I, Micromodem IIe automatically redials your last number.

Discover how Micromodem IIe can help maximize the capabilities of your Apple. While Smartcom I software will minimize your efforts.

Smartcom I companion software.

For effortless communications.

Whether you're a newcomer to personal computing or a seasoned professional, you'll appreciate the ease and speed with which you can perform any communications function. Thanks to Smartcom I!

Let Smartcom I guide you through a few easy-to-answer questions to tailor the program to your particular needs. Then you're ready to go!

Make a selection from the Smartcom I menu to manage your communications, files or printer. Program prompts guide you along the way. And menu selections let

you easily make a call, end a call, or answer a call. When you're on the receiving end, your Micromodem IIe answers automatically, even if you're not there!

Convenient! And so is the Smartcom I memory for phone numbers. Smartcom I stores three of your most frequently called telephone numbers and one prefix. Plus, it also remembers the last number dialed.

Smartcom I also provides a directory of the files stored on your disk. And lets you create, list, name, send, receive, print or erase files right from its menu.

Smartcom I is as versatile as you need it to be. It accepts DOS 3.3, Pascal, CP/MTM 3.0 or CP/M PlusTM operating systems. And accommodates up to six disk drives and several printer interface cards.

Like all our products, Smartcom I and Micromodem IIe are backed by excellent documentation and full support. Including a two-year limited warranty on Micromodem IIe and a 90-day warranty on Smartcom I!

See your dealer today. Then plug into the exciting world of telecomputing.

Hayes Microcomputer Products, Inc.,
5923 Peachtree Industrial Blvd., Norcross,
Georgia 30092. 404/441-1617.

FCC approved in U.S.A. Micromodem IIe is a registered trademark of Hayes Microcomputer Products, Inc. Smartcom I is a trademark of Hayes Microcomputer Products, Inc. Apple is a registered trademark of Apple Computer, Inc. Touch-Tone is a registered service mark of American Telephone and Telegraph. CP/M is a trademark of Digital Research, Inc. CP/M Plus is a trademark of Advanced Logic Systems. ©1983 Hayes Microcomputer Products, Inc.

What's New In Software

Language Learning on Apple and IBM

Lamplighter Software, Inc. has introduced *Language Lab*, a complete foreign language training system for Apple and IBM Personal Computers. Unlike computerized vocabulary builders, the *Language Lab* system teaches all skills necessary for fluency in a foreign language. The program offers computer-assisted study, self-quizzing, and an interactive audio cassette for pronunciation.

Included with the software is an interactive cassette adapter, which does away with the need to locate and play back pronunciation lessons manually on a cassette player. It automatically stops and starts the student's cassette player in coordination with the lessons presented on the display.

Language Lab is available for the Apple II/II+/Ile and the IBM PC and PCjr. It requires 64K RAM, one disk drive, and a cassette player. *Language Lab* is available in Spanish, French, and German, and is priced at \$235 per language.

Lamplighter Software, Inc., 7 Breton Ave., Melville, NY 11747. (516) 421-2653.

CIRCLE 420 ON READER SERVICE CARD



Data Management System from Hayes

Hayes Microcomputer Products Inc. has released *Please*, a fast, easy-to-use data management system for the IBM PC that makes it easy to organize information by simplifying data input and output.

The menu-driven software has 999 characters per field, 99 fields per record, 2000 characters per record, and several million per database, depending on the capability of the system.

Please offers speed and flexibility. Users can quickly change database structure,

merge and copy databases, and transfer data.

Other features include:

- Import/Export—transfers data to and from almost any other source, including Lotus 1-2-3, dBase II, VisiCalc, and other popular software programs.

- Quick List—meets one-time needs by quickly retrieving selected information from a database according to specific criteria.

- Output Plans—List, Form, Replacement, Export—manipulate selected information to meet specific needs in printing

and organizing data.

- Define—allows users to create new fields in the Output Plans based on other fields within the record. *Please* can be used with the IBM PC and compatibles. The software requires 128K RAM and two double-sided drives or a hard disk.

Please retails for \$349.

Application templates sell for \$29.95 each and include Mailing List, Membership, Applicants, Contacts, and Appointments. Others are also available.

Hayes Microcomputer Products, Inc., 5923 Peachtree Industrial Blvd., Norcross, GA 30092. (404) 449-8791.

CIRCLE 421 ON READER SERVICE CARD

 **Hayes**

Forth for the Apple

MasterForth, a complete professional programming language with a built-in macro-assembler, screen editor, and string handling package, is available from MicroMotion. MasterForth meets all provisions of the new Forth-83 International Standard. Input/output streams are fully redirectable and make full use of the Apple DOS 3.3 file system.

The package includes Forth Tools, a 200-page textbook, a technical reference manual, and a complete listing of the MasterForth nucleus. Forth Tools is required reading for the UCLA and UC Berkeley extension courses on Forth. MasterForth packages retail for \$100 to \$160.

MicroMotion, 12077 Wilshire Blvd., #506, Los Angeles, CA 90025. (213) 821-4340.

CIRCLE 422 ON READER SERVICE CARD

Correct Star from MicroPro

MicroPro International Corporation of San Rafael and Boston-based Houghton Mifflin Company, a leading publisher and lexical authority, have pooled their talents to announce *CorrectStar*. MicroPro is introducing *CorrectStar* as an enhancement to the *WordStar* family.

The accuracy of *CorrectStar* results from Houghton Mifflin's design of the lexical algorithm and its *American Heritage Dictionary* database. The 65,000-word *CorrectStar* database consists of 99% of



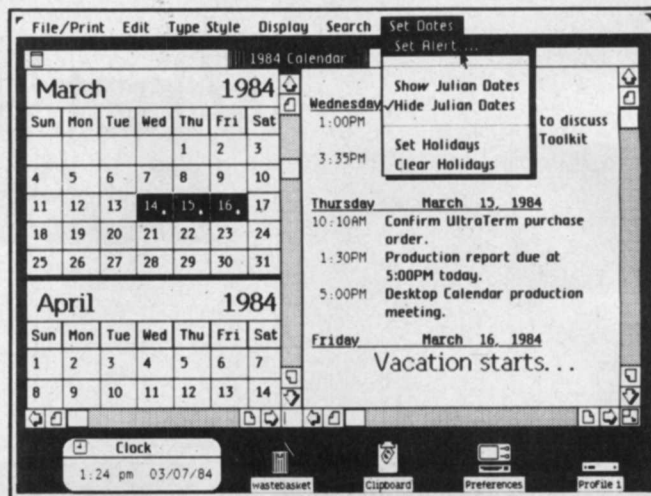
the most frequently used words in the English language as determined by frequency studies.

CorrectStar will become MicroPro's main spelling product in the 16-bit formats, but *SpellStar* continues as before in all 8-bit formats. However, as *CorrectStar* requires 192K of RAM, *SpellStar* will still be available as an alternative for computer systems with insufficient memory. The suggested retail price of *CorrectStar* is \$195 and upgrades from *SpellStar* are available at a cost of \$85.

MicroPro International Corporation, 33 San Pablo Ave., San Rafael, CA 94903. (415) 499-1200.

CIRCLE 423 ON READER SERVICE CARD

Time Management Software for Lisa



DeskTop Calendar, a time management software tool for the Lisa Office System, is available from Videx Inc. It combines a graphic calendar display with a notepad/appointment book. The user may select one or more days from the calendar, then enter notes, with or without appointment times, for each day. The program will also alert the user to appointments, even while another Office System tool is in use.

DeskTop Calendar is fully integrated into the Lisa Office System. If there are

several users of a single Lisa system, each user can generate his own calendar. The *DeskTop Calendar* window has all the attributes of an Office System window, including pull-down menus, scrollable and resizable panels, and the ability to exchange text with *LisaWrite* and *LisaDraw*. *DeskTop Calendar* has a suggested retail price of \$295.

Videx Inc., 1105 NE Circle Blvd., Corvallis, OR 97330. (503) 758-0521.

CIRCLE 424 ON READER SERVICE CARD

New Packages from Peachtree



Management Science America has announced the release of 25 new Peachtree Software packages in three areas.

Decision Maker leads off for personal productivity with the Peachtree "window" feature which permits the user to work on up to 20 projects at once (IBM PC, XT; \$625 introductory). Seven new packages make up the Peachtree Home Software Library for home productivity (IBM PC, PCjr; \$395). Joining the already established *PeachText 5000* in the office is *PeachPlan* for budgeting and forecasting (IBM PC and compatibles; \$295).

In the accounting area *Fixed Assets* brings the Business Accounting System up to eight modules (MS-DOS, CP/M;

\$595 per module). Aiming at small businesses, Peachtree introduced its *Back to Basics Accounting System* with three modules, General Ledger, Accounts Receivable, Accounts Payable—Apple, Macintosh, Atari, C-64; \$95 per module; \$195 per set. IBM PC, PCjr; \$295 per set.

The emphasis in the new products release was on the addition of an educational line with 16 new packages aimed primarily at Apple users (at this time) and mostly priced in the \$39.95 to \$49.95 range. Five programs use sound as a part of the learning experience: *Introduction to Poetry* and the four volume *Learning to Read Series* (speech synthesizer required). Also in the line are the *PSAT/SAT Analogies* program, a five volume *Writing Skills* series (also for IBM PC), and five games (*Merry Canned Nightmares and Dreams*; *Tranquility Base*; *Armageddon*; *Wilderness: A Survival Game*; and *Webster's Numbers*, for the young).

The new software announcements emphasize Peachtree's commitment to customer service through a toll-free number and upgrading support with information and special upgrade prices.

Peachtree Software, Inc., 3445 Peachtree Rd., NE, 8th Floor, Atlanta, GA 30326. (800) 554-8900.

CIRCLE 425 ON READER SERVICE CARD

THE BEST THING NEXT TO AN IBM PC IS A SPINWRITER.



Put a Spinwriter® next to your IBM® PC, or XT, and get the best letter-quality printing available anywhere. Spinwriter is totally IBM plug-compatible and works with every piece of IBM PC software. It also works with all popular third party applications packages.

Depending on your needs, you can choose between our popular 350 wpm model 3550, or our new 200 wpm model 2050.

Both give you world famous Spinwriter printing quality and reliability. And both were made for the IBM. That's why 55% of the letter-quality printers used with IBM PC's are Spinwriters.*

Spinwriter gives you over 60 different type styles. Each with up to 128 characters.

*PC WORLD Magazine, July 1983

Spinwriter is a registered trademark of NEC Corp. IBM is a registered trademark of International Business Machines Corp.

And there's a forms handling option for every paper and forms handling need. Which means no matter what form your business takes, Spinwriter can handle it.

So, if you want to get the most out of your IBM, get a Spinwriter. For more information, just call 1-800-343-4419; in Massachusetts call (617) 264-8635.

Also available at: Entré, 1-800-HI ENTRE, Computerland stores (in California) 1-800-321-1101; (outside California) 1-800-423-3008, Sears 1-800-228-2200 and IBM Product Centers.

Find out why most IBM PC users are saying, "NEC and me."

Yes! I want only the best for my IBM PC.

Please send me more information on:

☐ spinwriter 3550 ☐ spinwriter 2050

Name _____ Title _____

Company _____

Address _____

City _____

State _____ Zip _____

NEC Information Systems, Inc.
1414 Massachusetts Avenue
Boxborough, MA 01719

CC784

NEC AND ME





Announcing a small imp

It's 12" x 11¼" x 2¼"

It weighs less than 8 pounds.*

And costs less than \$1,300.**

Yet with 128K, the new Apple® IIc Personal Computer is a lot bigger than it looks.

The IIc has a full-size keyboard.



Because it's inherited all the talents of the eminently talented Apple IIe:

The versatility to run over 10,000 different software programs.

The ironclad reliability of the first true VLSI motherboard.

And the artistic ability of 16 high-resolution colors.

The IIc also has some talents of its very own.

For instance, a switchable 80/40-character display.

Switchable QWERTY/Dvorak keyboard.



Thin, isn't it? Even with its built-in disk drive.

A built-in half-high 143K single-sided disk drive.

Built-in serial ports for modems, printers and an extra half-high drive.

Even built-in mousetronics so it's ready to use a mouse and all the new Apple II mouseware.

And our newest brainchild is certainly not an orphan.

You can grow it with a whole family of Apple II accessories and peripherals.

Koala Conquers The Keyboard!

The **KoalaPad™** is a touch-sensitive controller for your computer. The KoalaPad eliminates the need for tedious keyboard entry, difficult-to-follow instruction manuals and complicated commands. With the KoalaPad, you're in charge.

Touch And Command

Whether you own an Apple®, Atari®, Commodore®, IBM® PC or PCjr, the KoalaPad and its ever-growing library of software will make your computer come alive. The KoalaPad unlocks the power and versatility of your computer.

Assert your creativity with easy-to-use graphic design programs. There's even KoalaWare™ software to let you print out your designs.

The KoalaPad is a proven educational tool. Programs like Spider Eater™ and KoalaGrams™ help children to rapidly develop the ability to understand and relate concepts of color, form, design, music and language.

New Business Software

In addition to business graphics, our productivity software will strengthen your grip on the bottom line. Koala's Speed Key™ will send your fingers flying through important programs like Visicalc®, SuperCalc®, Lotus 1-2-3™, WordStar®, Multiplan™, pfs®: write and dBASE II™.



Take Control

KoalaPads and software are available at many computer retail, catalog and fine department stores throughout the United States. For more information, see your local dealer or call toll free: 800-562-2327.


At Koala, we're putting computer control into everyone's hands.

Koala Technologies Corporation
3100 Patrick Henry Drive
Santa Clara, California
95052-8100

KoalaPad Sales	Jan	Feb	Mar	Apr	May	Jun	TOTALS
Apple	2000	2100	2800	5000	4566	1800	17466
Atari	2000	1100	1000	200	200	100	4500
Commodore	4000	2000	2000	1000	500	2000	12500
IBM PC	1000	2000	2000	4000	3000	2000	15000
IBM PCjr							
VIC 20	500	400	300	300	250	200	1950
TOTALS	9500	7600	10100	10500	8516	6300	52816
IBM TOTAL							
5282 TOT	8500	5600	7100	6400	5516	4300	37816

Koala's Speed Key with Lotus 1-2-3

1-2-3™ and LOTUS™ are trademarks of Lotus Development Corporation. pfs®: write is a registered trademark of Software Publishing Corporation. SuperCalc® is a registered trademark of Sorcim Corporation. Multiplan is a trademark of Microsoft Corporation. Visicalc® is a registered trademark of Personal Software Inc. WordStar® is a registered trademark of MicroPro® International Corporation. dBASE II™ is a trademark of ASHTON-TATE.

Apple is a registered trademark of Apple Computers, Inc. Atari is a registered trademark of Atari, Inc. Commodore 64 is a registered trademark of Commodore Business Machines, Inc. IBM is a registered trademark of International Business Machines, Inc. KoalaPad, Spider Eater, KoalaGrams, Speed Key, KoalaPainter, KoalaWare and the symbol  are trademarks of Koala Technologies Corp.

Koala
Technologies Corporation

We make computing more personal.™

Structured Programming In Basic

Part 3: An Application

Arthur Luehrmann

The first two articles in this series introduced the two main ideas of structured programming: (1) how to use the top-down method of planning a whole program and (2) how to use three types of formal control blocks to handle all problems of program logic. This month's article shows how to apply these tools, in Basic, to an actual programming problem.

The Problem

As pointed out in last month's article, the real payoff of using the tools of structured programming comes when you are faced with a big job. Small programming tasks usually yield to a brute force attack, but as the job gets bigger it gets disproportionately harder to get the program to work.

An hour or so of trial-and-error patching and debugging is multiplied into weeks or months when the number of program lines goes from 100 to 1000. Many programmers hit their "wall" on these long programs. Structured programming methods promise to change all that and bring the difficulty of the job back into proportion with the size of the program that will result.

Unfortunately, it is not practical in these few pages to present a truly big programming job and show how to solve it. That would take too much space and time. So, although we are forced to pick a smallish example for now, keep in mind that it is a stand-in for *any* programming problem you may face. The methods shown here are exactly the same ones to use on a program of 1000 lines or 5000 lines.

The programming example we have chosen is a simple word game. We want to have the computer play the game with a user of the program. Here is an informal description of the game as two people might play it together:

The game starts when Susan thinks of a secret word. After that, Bill tries again and again to guess the word. Each time, Susan tells Bill whether the secret word is earlier or later in the dictionary than the one Bill guessed. As soon as Bill guesses correctly, Susan says "You got it!" and the game ends.

Our goal will be to write a program that tells the computer precisely how to play Susan's part in the game. Though this task is simple enough to handle by almost any method, let's see how the structured approach works.

Top-Down Planning

The *wrong* thing to do at this point is to go to the computer and begin entering Basic statements. Instead, let's recall the steps of the top-down method of planning any program. Here they are:

1. Always start by planning a simple main routine. Use English phrases to describe the major tasks to be done. Avoid thinking about details.
2. Translate each English phrase into one or two Basic statements. If more are needed, use a GOSUB statement to refer to a subroutine that will contain the details.
3. Write skeleton versions of the subroutines, including PRINT statements for debugging. Run the program and check that things are done in the right order.
4. Fill in the details of each subroutine. Use these same four steps with each subroutine. If new, more detailed subroutines are created in the process, do the same four steps with them.
5. After the program is working according to the original plan, undertake any refinements you think necessary or desirable.

We begin with step 1: planning the main routine. A good starting point for such a plan is an ordinary outline written in English. Here is a possible way to describe the game in outline form:

1. Susan thinks of a secret word.
 2. Bill guesses again and again, and Susan gives hints until he gets it right.
 3. Susan congratulates him.
- Now it is easy to see how to convert the steps of the outline into the main routine of our program. Here is the first stage of the conversion, partly in Basic and partly still in English:

```
100 PROGRAM GUESSING GAME
110   get secret word
120   guess words
130   wrap up game
140 END
```

Note that the outline gives no details. How does the computer get the secret word? How does the user guess words? How does the computer wrap up the game? At this stage, it makes no difference how the computer does these things. In fact, these details are exactly the wrong things to think about now. Details will come later, when we write the subroutines that tell the computer what these "top-level" instructions mean.

Now we go on to step 2 of the top-down method: converting the main routine completely into Basic statements. There are no simple Basic statements that you can substitute for the English phrases. That means we should use a GOSUB for each one:

```
100 'PROGRAM GUESSING GAME
110   GOSUB 200 'SECRET WORD
120   GOSUB 400 'GUESS WORDS
130   GOSUB 600 'WRAP UP
140   END
```

Note that we have used the apostrophe (') abbreviation for REM and :REM, as several current versions of Basic allow. To improve readability, we have indented the body of the main routine. In some versions of Basic, one must use colons to get indentation.

Now that the main routine is finished (and we will never return to it!), it is time to go on to step 3: writing skeleton subroutines, entering the program, and checking for errors. Each skeleton subroutine should have a PRINT statement saying which routine it is. The purpose here is to allow us to verify that the overall structure of the program is correct before going on. Here is the program with skeleton subroutines:

```
100 'PROGRAM GUESSING GAME
110   GOSUB 200 'SECRET WORD
120   GOSUB 400 'GUESS WORDS
130   GOSUB 600 'WRAP UP
140   END
190 '
200 'SUB SECRET WORD
210   PRINT "SECRET WORD SUBROUTINE"
380   RETURN
390 '
400 'SUB GUESS WORDS
410   PRINT "GUESS WORDS SUBROUTINE"
580   RETURN
590 '
600 'SUB WRAP UP
610   PRINT "WRAP UP SUBROUTINE"
780   RETURN
```

Now we have a complete Basic program that can be entered into the computer and run. It won't play the game yet, but as soon as the computer prints

SECRET WORD SUBROUTINE
GUESS WORDS SUBROUTINE
WRAP UP SUBROUTINE

we will be certain that the structure of the program is correct and that all the GOSUBS and RETURNS are in good working order. Then we will have a strong framework that will allow us to concentrate on each block of the program without worrying about the others.

Next we go on to step 4 of the top-down process: Filling in the details of each subroutine body. We begin with the SECRET WORD routine. What must it tell the computer to do? Remember that the purpose of this routine is to have the computer do what Susan did when she "thought of a secret word." Unfortunately, computers don't know many English words, so this part looks hard. We'll take the easy way out and have the

computer ask someone other than the player to enter a secret word.

To fill in the body of the subroutine, we follow exactly the same rules we used for the main routine: (1) make an outline in English, (2) convert it to Basic, and (3) write more skeleton subroutines if necessary. Here is an outline version of SECRET WORD:

```
200 'SUB SECRET WORD
210   clear the screen
220   ask for secret word
230   input secret word
380   RETURN
```

Lines 200 and 380 are holdovers from the skeleton version. The next step is to replace each English phrase with one or two Ba-

***Our goal will be to write a program
that tells the computer precisely
how to play Susan's
part in the game.***

sic statements to carry out the task described, or else to use a GOSUB to a new subroutine. Here is the result:

```
200 'SUB SECRET WORD
210   CLS
220   PRINT "WHAT'S THE SECRET WORD";
230   INPUT $$
380   RETURN
```

Line 210 might be different in different versions of Basic. In Applesoft, for example, the statement is spelled HOME. Note that each English phrase was easily convertible into one Basic statement, so no new GOSUBS were necessary.

The last step for this subroutine is to enter these new body statements into the computer and check for errors. Checking is best done in the immediate mode (if available) by typing GOSUB 200. If all is in order, the screen should be erased, the prompt message should be printed, and the computer should wait for input. Entering any word should cause a return from the subroutine. Then, entering PRINT \$\$ in immediate mode will confirm that the word was correctly assigned to \$\$.

Using Control Blocks

We can now turn to the GUESS WORDS subroutine, which is the heart of the entire program. Its job is to tell the computer to accept guess after guess from the user, give hints if the guess is wrong, and stop asking for more guesses if the guess is right. Obviously, there are many details to worry about here.

The trick is *not* to get bogged down in details. Instead, think about the *structure* of the problem. Recall how two people play the game. Once Susan thinks of a secret word, Bill guesses again and again, getting hints along the way, until he guesses the right word. What kind of program structure tells the computer to do something "again and again until" some condition becomes true?

If the answer doesn't jump to mind, remember the Boehm and Jacopini theorem from last month's article:

Theorem: Any program logic, no matter how complex, can be resolved into only three kinds of blocks: *actions*, *loops*, and *branches*.

Action blocks are just straight sequences of action statements, such as INPUT, LET, and PRINT, which are to be performed one after the other. Loop blocks contain statements that are to be performed again and again until some *exit condition* becomes

Can Your Word Processor Keep Up With Your 100 WPM Typist?

It can if you have WordPerfect!

Try this test. While using your favorite word processor, put the cursor in the middle of a paragraph, turn insert on, and type. Surprisingly, very few of the leading word processors can keep up with 70, 60, or even 50 words per minute. WordPerfect keeps up easily at speeds well above 100*.

Now, maybe this doesn't matter to you, because you don't type 100 or even 50 WPM. But you still don't want to wait forever to go to the beginning of your document, go to page 5, save your document, or add a paragraph.

At SSI anything less than fast is unacceptable. And not just because time is money, or because wasting time is foolish.



Delays are very frustrating, and frustration can easily lower the quality of your writing.

Try WordPerfect.

WordPerfect

**You'll love it—
not only for the
features we've built in,
but also for the
delays we left
out.**



*Based on tests performed on an IBM PC.

SATELLITE SOFTWARE INTERNATIONAL

288 WEST CENTER STREET, OREM, UTAH 84057 (801) 224-4000 TELEX 820-618

SSI

CIRCLE 164 ON READER SERVICE CARD

**Spill on it.
Puncture it.
Crease it.
Burn it.
Shock it.
Delete wrong
information.
Or just have
it go bad.**

Sooner or later, you're going to have a valuable word processing, spread sheet or data base disk go bad on you. And no matter whether it's due to physical damage or unexplained failure, hours or even days of work will go down the drain. Unless you have Mr. Fixit—the new, state-of-the-art data retrieval program from Omega MicroWare.

As long as your problem disk is unprotected and will spin in its drive, Mr. Fixit will scan it and tell you which tracks and sectors are readable and exactly how much information you can expect to recover. Then it will let you copy all recoverable information...and with Mr. Fixit almost everything is...onto a new disk.

If you've accidentally deleted information, Mr. Fixit can recover it for you, as long as you haven't written over it. If you've lost your disk catalog, Mr. Fixit can restore that, too. For more sophisticated users, Mr. Fixit can also edit selected disk sectors and perform DOS "hot patches" and disassembler functions.

So, if you're an Apple or IBM-PC computer user with a lot of valuable data disks on file, don't risk losing them a day longer. Get Mr. Fixit and fix blown disk problems for good!

Mr. Fixit is available at most software stores, or direct by sending \$49.95 plus \$3.50 shipping and handling to address below. For immediate delivery, call tollfree: 1-800-238-2300.



OMEGA MICROWARE, INC.
177 West Hintz Road, Wheeling,
IL 60090, (312) 537-3045



**For Apple
and IBM-PC**

MR. FIXIT™ can fix it!

Mr. Fixit is a trademark of Omega Microware, Inc. Apple and IBM-PC are trademarks of Apple Computer, Inc. and IBM Corp., respectively. © Omega Microware, Inc. 1984

CIRCLE 152 ON READER SERVICE CARD

true. Branch blocks contain two groups of statements only one of which is to be performed.

Now we come back to our question: Which kind of program block will be needed to tell the computer to accept guesses again and again until the guess is correct? A loop block, of course. The exit condition from the loop is that the guess matches the secret word.

Now we can get started on the body of the GUESS WORDS subroutine. The first step is to write a bare-bones outline of the loop block and put it inside GUESS WORDS. Here it is, with the loop in lines 410 through 500:

```

400 'SUB GUESS WORDS
410 'LOOP
_____ do something
_____ IF exit-condition THEN 500
_____ do something
490 GOTO 410
500 'END LOOP
580 RETURN

```

The next step is to figure out what the two "do somethings" and the "exit-condition" are. The first "do something" has to ask for the user's guess and accept it as input. The "exit-condition" is that the guess is correct. The second "do something" has to give the user a helpful hint. Here is a more detailed outline of the loop block:

```

400 'SUB GUESS WORDS
410 'LOOP
_____ ask for guess
_____ input guess
_____ IF guess is correct THEN 500
_____ give a hint
490 GOTO 410
500 'END LOOP
580 RETURN

```

We can easily replace the first two phrases with Basic statements. We need a Basic condition in the IF statement to test whether the guess is correct. If the guess is incorrect, the computer must "give a hint." It will take more than one or two Basic statements to give a hint, so we use a GOSUB and bury details in a new subroutine. Here is the complete version of GUESS WORDS:

```

400 'SUB GUESS WORDS
410 'LOOP
420 PRINT "WHAT'S YOUR GUESS";
430 INPUT G$
440 IF G$ = S$ THEN 500
450 GOSUB 800 'HINT
490 GOTO 410
500 'END LOOP
580 RETURN

```

To test this subroutine, we need a skeleton version of the HINT subroutine. Here it is:

```

800 'SUB HINT
810 PRINT "HINT SUBROUTINE"
980 RETURN

```

Now we can do our testing of GUESS WORDS. We first enter all the new body statements in lines 410 through 500, plus the skeleton version of HINT. Next we enter LET S\$ = "CAT" in immediate mode to establish a value for the secret word. Then we enter GOSUB 400 in immediate mode. After that, we can test the loop by replying to the input prompts with a series of words, such as DOG, RAT, BAT, CAT. The computer should stay in the loop, printing HINT SUBROUTINE after each reply until the reply is CAT. After that, the return should occur.

July 1984 © Creative Computing

It is tempting now to plunge in and finish work on subroutine HINT. That, however, is a detail that is best put off until we finish with the last of the three original subroutines, WRAP UP. Its job is to have the computer print a final message saying that the game is over and the word was guessed. So little planning is needed for this routine that we can write it directly in Basic and test it in the immediate mode, like the others. Here it is:

```

600 'SUB WRAP UP
610 PRINT "YOU GOT IT!!!"
620 PRINT "THE WORD WAS"; S$
780 RETURN

```

Another Control Block

We have now completed the main routine and all three subroutines it calls. But the job is not over. Subroutine GUESS WORDS has a GOSUB 800 to a subroutine named HINT.

Branch blocks contain two groups of statements only one of which is to be performed.

HINT exists only in skeletal form. What should we write for the body of HINT?

The trick, once again, is *not* to get bogged down in details. Instead, think about the *structure* of the problem. Recall how people play the game. After each wrong guess, Susan tells Bill that the secret word is *either* earlier *or* later in the dictionary than Bill's guess. What kind of program structure tells the computer to do either one thing *or* another?

The answer is the branch block. (If there are any doubts, just go through the three possibilities allowed by Messrs. Boehm and Jacopini.) Knowing that, the next step is easy: writing a bare-bones outline of the branch block as the body of the HINT subroutine. Here it is:

```

800 'SUB HINT
810 IF condition THEN 850
_____ 'FALSE
_____ do something
_____ GOTO 870
850 'TRUE
_____ do something
870 'END IF
980 RETURN

```

Lines 810 through 870 contain the outline of *any* branch block. Our job is to convert "condition" and the two "do somethings" into the right Basic for the job that HINT must do, which is to print one of two possible prompting messages. For example, if the secret word (S\$) is CAT and the guess (G\$) is BAT, then the computer should print LATER THAN BAT.

If the guess is RAT, the computer should print EARLIER THAN RAT. Here is a more specific outline of the branch block:

```

800 'SUB HINT
810 IF secret earlier than guess THEN 850
_____ 'FALSE
_____ give "later" hint
_____ GOTO 870
850 'TRUE
_____ give "earlier" hint
870 'END IF
980 RETURN

```

COMPUTER MAIL ORDER



HOME COMPUTERS



1010 Recorder.....	*74.00
1020 Color Printer.....	*249.00
1025 Dot Matrix Printer.....	*349.00
1027 Letter Quality Printer.....	*309.00
1030 Direct Connect Modem.....	*119.00
1050 Disk Drive.....	*339.00
CX30 Paddle.....	*12.00
CX40 Joystick..... each	*8.00
CX77 Touch Tablet.....	*64.00
CX80 Trak Ball.....	*48.00
CX85 Keypad.....	*105.00
488 Communicator II.....	*229.00
4003 Assembler Editor.....	*47.00
4011 Star Raiders.....	*33.00
4012 Missile Command.....	*29.00
4013 Asteroids.....	*29.00
5049 VisiCalc.....	*159.00
7079 Logo.....	*79.00

600XL.....	*189
800XL.....	*299
1200XL.....	CALL
1400XL.....	CALL

7101 Entertainer.....	*69.00
7102 Arcade Champ.....	*75.00
8026 Dig Dug.....	*33.00
8030 ET: Phone Home.....	*33.00
8031 Donkey Kong.....	*39.00
8033 Robotron.....	*35.00
8034 Pole Position.....	*35.00
8036 Atari Whiter.....	*79.00
8040 Donkey Kong, Jr.....	*39.00
8043 Ms. Pacman.....	*39.00
8044 Joust.....	*39.00

ALIEN VOICE BOX

Atari.....	*119.00
Apple.....	*149.00

PRINTERS

AXIOM

AT-100 Atari Interface Printer.....	*239.00
GP-100 Parallel Interface.....	*199.00
AT-846 Interface for Atari.....	*89.00

BMC

401 Letter Quality.....	*589.00
BX-80 Dot Matrix.....	*269.00

CENTRONICS

122 Parallel.....	*299.00
739-1 Parallel.....	*199.00
739-3 Serial.....	*249.00

CJTOH

Gonila Banana.....	*209.00
Prowriter 8510P.....	*379.00
Prowriter 1550P.....	*599.00
A10 (18 cps).....	*569.00
8600 P.....	*929.00
F10-40.....	*999.00
F10-55.....	*1349.00

COMREX

ComWriter II Letter Quality.....	*499.00
----------------------------------	---------

DIABLO

620 Letter Quality.....	*949.00
630 Letter Quality.....	*1749.00

DAISYWRITER

2000.....	*949.00
Tractor Feed.....	*109.00

EPSON

RX-80, RX-80FT, RX-100.....	CALL
FX-80, FX-100.....	CALL
LQ 1500.....	CALL

IDS

Phsm 80 For Configuration.....	CALL
Phsm 32 For Configuration.....	CALL

JUKI

6100.....	*499.00
-----------	---------

MANNESMAN TALLY

160L.....	*589.00
180L.....	*799.00
Sprint 80.....	*309.00

NEC

8023 Dot Matrix.....	*379.00
8025 Dot Matrix.....	*669.00
2010/15/30.....	*749.00
3510/15/30.....	*1369.00
7710/15/30.....	*1799.00

OKIDATA

82, 83, 84, 92, 93, 2350, 2410.....	CALL
-------------------------------------	------

OLYMPIA

Compact 2.....	*479.00
Compact FO.....	*509.00
ESW 3000.....	*1449.00

SMITH CORONA

TP-1000.....	*399.00
Tractor Feed.....	*119.00

SILVER REED

500 Letter Quality.....	*449.00
550 Letter Quality.....	*569.00
770 Letter Quality.....	*899.00

STAR

Gemini 10X.....	*299.00
Gemini 15X.....	*399.00
Delta 10.....	*449.00
Serial Board.....	*75.00
Radix 10.....	*599.00
Radix 15.....	*699.00

TOSHIBA

1340.....	*669.00
1351.....	*1699.00

TRANSTAR

120P.....	*499.00
130P.....	*689.00
315 Color.....	*499.00

MEMORY BOARDS

Axion 32K.....	*59.00	Intec 32K.....	*59.00
Axion 48K.....	*99.00	Intec 48K.....	*85.00
Axion 128K.....	*299.00	Intec 64K.....	*99.00
		Intec Real Time Clock.....	*29.00

DISK DRIVES FOR ATARI

PERCOM	INDUS
AT 88-S1.....	GT Drive.....
AT 88-A1.....	
AT 88-S1 PD.....	
RFD 40-S1.....	
RFD 40-S2.....	
RFD 44-S1.....	
	RANA
	1000.....
	TRAK
	AT-D2.....

MODEMS

ANCHOR

Volkmodem.....	*59.00
Mark II.....	*79.00
Mark VII (Auto Ans/Auto Dial).....	*119.00
Mark XII (1200 Baud).....	*299.00
TRS-80 Color Computer.....	*99.00
9 Volt Power Supply.....	*9.00

HAYES

Smartmodem 300.....	*209.00
Smartmodem 1200.....	*499.00
Smartmodem 1200B.....	*449.00
Micromodem II.....	*269.00
Micromodem 100.....	*299.00
Smart Com II.....	*89.00
Chronograph.....	*199.00

NOVATION

J-Cat.....	*99.99
Cat.....	*139.00
Smart Cat 103.....	*399.00
Smart Cat 103/212.....	*179.00
AutoCat.....	*219.00
212 AutoCat.....	*549.00
Apple Cat II.....	*249.00
212 Apple Cat.....	*449.00
Apple Cat 212 Upgrade.....	*269.00

ZENITH

ZT-1.....	*339.00
ZT-10.....	*309.00
ZT-11.....	*369.00

DISKETTES

MAXELL	ELEPHANT
5 1/4" MD-1.....	5 1/4" SS/SD.....
5 1/4" MD-2.....	5 1/4" SS/DD.....
8" FD-1 (SS/DD).....	5 1/4" FD/DD.....
8" FD-2 (DS/DD).....	

VERBATIM

5 1/4" SS/DD.....	*26.99
5 1/4" DS/DD.....	*36.99

BIB

5 1/4" Disk Head Cleaner.....	*14.99
-------------------------------	--------

DISK HOLDERS

Rip-n-File 10.....	*3.99
Rip-n-File 50.....	*17.99
Rip-n-File (400/800 ROM) Holder.....	*17.99

CONTROLLERS & JOYSTICKS

WICO	KRAFT
Joystick.....	Joystick.....
3-way Joystick.....	Atari Single Fire.....
Power Gnp.....	Atari Switch Hitter.....
BOSS Joystick.....	Apple Paddles.....
ATARI/VIC Trak Ball.....	IBM Paddles.....
Apple Trak Ball.....	IBM Joystick.....
Apple Analog.....	
AMIGA	KOALA PADS
3100 Single.....	Atari (ROM).....
3101 Pair.....	C-64 (ROM).....
Joystick.....	IBM.....
	Apple/Franklin.....

MONITORS

AMDEK

300 Green.....	*149.00
300 Amber.....	*159.00
310 Amber.....	*169.00
Color 1.....	*279.00
Color 1 Plus.....	*299.00
Color 2 Plus.....	*419.00
Color 3.....	*349.00
Color 4.....	*749.00

BMC

12" Green.....	*88.99
12" Green Hi-Res.....	*119.99
9191-13" Color.....	*249.00

GORILLA

12" Green.....	*88.99
12" Amber.....	*95.99

NEC

JB 1260 Green.....	*109.00
JB 1201 Green.....	*149.99
JB 1205 Amber.....	*159.99
JB 1215 Color.....	*259.00
JC 1216 RGB.....	*429.00
JC 1460 Color.....	*359.00

PRINCETON GRAPHICS

HX-12 RGB.....	*529.00
----------------	---------

SAKATA

100.....	*269.00
----------	---------

TAXAN

210 Color RGB.....	*299.00
400 Mid-Res RGB.....	*319.00
415 Hi-Res RGB.....	*439.00
420 Hi-Res RGB (IBM).....	*489.00
100 12" Green.....	*125.00
105 12" Amber.....	*135.00

USI

P1 1, 9" Green.....	*99.99
P2 2, 12" Green.....	*119.99
P3 3, 12" Amber.....	*149.99
P4 4, 9" Amber.....	*139.99
1400 Color.....	*269.99

QUADRAM

Quadchrome 8400 Color.....	*529.00
----------------------------	---------

ZENITH

ZVM 122 Amber.....	*109.00
ZVM 123 Green.....	*89.99
ZVM 135 Color/RGB.....	*469.99

east

800-233-8950

In PA call (717)327-9575, Dept. 112
Order Status Number: 327-9576
Customer Service Number: 327-1450
477 E. 3rd St., Williamsport, PA 17701

canada

Ontario/Quebec

800-268-3974

Other Provinces 800-268-4559
In Toronto call (416)828-0866, Dept. 112
Order Status Number: 828-0866
2505 Dunwin Drive, Unit 38
Mississauga, Ontario, Canada L5L1T1

west

800-648-3311

In NV call (702)588-5654, Dept. 112
Order Status Number: 588-5654
P.O. Box 6689
Stateline, NV 89449

No risk, no deposit on C.O.D. orders and no waiting period for certified checks or money orders. Add 3% (minimum \$5) shipping and handling on all orders. Larger shipments may require additional charges. NV and PA residents add sales tax. All items subject to availability and price change. Call today for our catalog. CANADIAN ORDERS: All prices are subject to shipping, tax and currency fluctuations. Call for exact pricing in Canada.



COMPUTER MAIL ORDER

APPLE/FRANKLIN DISK DRIVES

MICRO-SCI	
A2	*219.00
A40	*299.00
A70	*319.00
C2 Controller	*79.00
C47 Controller	*89.00

RANA	
Elite 1	*279.00
Elite 2	*389.00
Elite 3	*569.00

APPLE IIe STARTER PACK
64K Apple IIe, Disk Drive & Controller,
80 Column Card, Monitor II & DOS 3.3
COMPLETE.....CALL

MBC 550.....CALL	
MBC 555.....CALL	
MBC 1100	*1499.00
FDD 3200-320K Drive	*389.00
MBC 1150	*1899.00
MBC 1200	*1849.00
FDD 6400-640K Drive	*469.00
MBC 1250	*2099.00
PR 5500 Printer	*599.00

NEC
PC-8201
***489**



SHARP	
PC-1500A.....*165**	
PC-1250A.....*88**	

HP 10C	*51.99
HP 11C	*69.99
HP 12C	*88.99
HP 15C	*88.99
HP 16C	*88.99
HP 75C	*749.99
HPIL Module	*98.99
HPIL Cassette or Printer	*359.99
Card Reader	*143.99
Extended Function Module	*63.99
Time Module	*63.99

commodore

CBM 8096	*869.00
CBM 9000	*999.00
8128-80	*769.00
8032 to 9000 Upgrade	*269.00
2031 LP Disk Drive	*299.00
8050 Disk Drive	*949.00
8250 Disk Drive	*1199.00
4023 Printer	*379.00
8023 Printer	*569.00
6400 Printer	*1399.00
Z-RAM	*499.00
Silicon Office	*699.00
The Manager	*199.00
SoftROM	*125.00
VisiCalc	*159.00

PROFESSIONAL SOFTWARE	
Word Pro 2 Plus	*159.00
Word Pro 3 Plus	*189.00
Word Pro 4 Plus/5 Plus	*279.00
InfoPro	*179.00
Administrator	*399.00
Power	*79.00

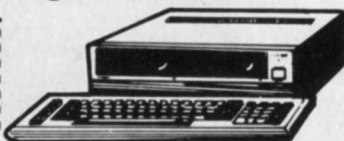
MSD	
SD1 Disk Drive	*349.00
SD2 Disk Drive	*599.00

FRANKLIN



ACE 1000 Color Computer.....CALL
ACE Family Pack System.....CALL
ACE PRO PLUS System.....CALL
ACE 1200 Office Mgmt. System.CALL
"NOT ILE EXPENSIVE"

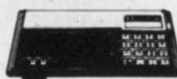
SANYO



NEC
PC-B221A Thermal Printer.....*149.99
PC-B281A Data Recorder.....*99.00
PC-B201-06 8K RAM Chips.....*105.00
PC-B206A 32K RAM Cartridge*329.00

CE-125 Printer/Cassette.....	*128.99
CE-150 Color Printer/Cassette	*171.99
CE-155 8K RAM.....	*93.99
CE-161 16K RAM.....	*134.99
CE-500 ROM Library.....	*29.99

hp HEWLETT PACKARD



HP 71B *449**
41CV.....*209**
41CX.....*249**

SX-64

Portable

CBM 8032.....*599	
CBM 64.....*199	
C1541 Disk Drive	*249.00
C1530 Datasette	*69.00
C1520 Color Printer/Plotter	*129.00
M-801 Dot Matrix Printer	*219.00
C1526 Dot Matrix/Serial	*299.00
C1702 Color Monitor	*249.00
C1311 Joystick	*4.99
C1312 Paddles	*11.99
C1600 VIC Modem	*59.00
C1650 Auto Modem	*89.00
Logo 64	*49.00
Pilot 64	*39.00
Word Pro 64 Plus	*59.00
Parallel Printer Interface	*49.00
Calc Result 64	*65.00
Calc Result Easy	*39.00
Codemaster 64	*75.00
Quick Brown Fox	*49.00
MCS 801 Color Printer	*499.00
DPS 1101 Daisy Printer	*459.00
Magic Voice Speech Module	*54.00
Disk Organizer Lock	*49.00
Vidtex Telecommunications	*34.95

IBM

NEC PRINTERS

NEC 2050	*899.00
NEC 3550	*1639.00

PERCOM/TANDON DISK DRIVES

5 1/4" 320K Roppy	*229.00
5 Meg Hard w/Controller	*1049.00
10 Meg Hard w/Controller	*1349.00
15 Meg Hard w/Controller	*1599.00
20 Meg Hard w/Controller	*1899.00

AMDEK

310A Amber Monitor	*169.00
Color 2	*419.00
Color 4	*749.00

AST RESEARCH

Six Pak Plus	from *279.00
Combo Plus II	from *279.00
Mega Plus	from *309.00
I/O Plus	from *139.00

QUADRAM

Quadlink	*479.00
Quadboard	as low as *289.00
Quad 512 Plus	as low as *249.00
Quadcolor	as low as *219.00
Chronograph	*89.00
Parallel Interface Board	*89.00
64K RAM Chips Kit	*59.00

CONTINENTAL SOFTWARE

1st Class Mail/Form Letter	*79.00
Home Accountant Plus	*88.00



MICROPRO

WordStar Professional Pack	*389.00
InfoStar	*299.00
SpellStar	*159.00
CalcStar	*99.00

MICROSTUF

Crosstalk	*105.00
-----------	---------

MICROSOFT

MultiPlan	*159.00
-----------	---------

ASHTON-TATE

dBASE II	*389.00
Friday!	*185.00

IUS

EasyWriter II	*249.00
EasySpeller	*119.00
EasyFiler	*229.00

LOTUS

Symphony 1-2-3	CALL *329.00
----------------	--------------

PROFESSIONAL SOFTWARE
PC Plus/The Boss *329.00

SYNAPSE

File Manager	*89.00
--------------	--------

SOFTWARE

C-64 Atari IBM Apple

Electronic Arts
Axis Assassin
M.U.L.E.
Pinball Construction
Cut & Paste
Hard Hat Mack

InfoCom

Witness

Infidel

Starcross

Planetfall

Enchanter

Zork

AtariSoft

Dig Dug

Defender

Robotron 2084

PacMan

Donkey Kong

Spinnaker

Story Machine

Cosmic Life

Up for Grabs

Kindercomp

Snooper Troops

Delta Drawing

Kids on Keys

Hay Diddle Diddle

Facemaker

Rhymes & Riddles

Dynatech

Code Writer

VisiCorp

VisiCalc

VisiCalc Advanced

VisiText/Plot

VisiFile

VisiSchedule

Desktop Plan

Business Forecast Model

StretchCalc

Visi Tutor Calc

Visi Tutor Advanced

Visi Tutor Word

p/s:

White

Graph

Report

File

Solutions.* as low as

*Call on Titles

C-64 Atari IBM Apple

*17** *17** N/A *17**

*29** *29** N/A *29**

*29** *29** N/A *29**

*39** *39** N/A *39**

*29** *29** N/A *29**

*32** *32** N/A *32**

*32** *32** N/A *32**

*32** *32** N/A *32**

*32** *32** N/A *32**

*29** *29** N/A *29**

*37** N/A *29** *29**

*37** N/A *29** *29**

*29** N/A *29** *29**

*37** N/A *29** *29**

*37** N/A *29** *29**

*24** *24** *29** *29**

*24** *24** N/A N/A

*24** *24** N/A N/A

*21** *21** *24** *21**

*29** *29** N/A *29**

*29** *29** N/A *29**

*29** *29** N/A *29**

*21** *21** *24** *21**

N/A *21** *24** *24**

*79** *79** *175** *155**

*159** *159** *159** *159**

N/A N/A B/A *269**

N/A N/A *199** *199**

N/A N/A *199** *169**

N/A N/A *199** *199**

N/A N/A *199** *169**

N/A N/A *75** *75**

N/A N/A *75** *75**

N/A N/A *59** *59**

N/A N/A *75** *75**

N/A N/A *59** *59**

N/A N/A *89** *79**

N/A N/A *89** *79**

N/A N/A *89** *79**

N/A N/A *16** *16**

east

800-233-8950

In PA call (717)327-9575, Dept. 112
Order Status Number: 327-9576
Customer Service Number: 327-1450
477 E. 3rd St., Williamsport, PA 17701

canada

Ontario/Quebec

800-268-3974

Other Provinces 800-268-4559
In Toronto call (416)828-0866, Dept. 112
Order Status Number: 828-0866
2505 Dunwin Drive, Unit 38
Mississauga, Ontario, Canada L5L1T1

west

800-648-3311

In NV call (702)588-5654, Dept. 112
Order Status Number: 588-5654
P.O. Box 6689
Stateline, NV 89449

INTERNATIONAL ORDERS: All shipments outside the Continental United States must be pre-paid by certified check only. Include 3% (minimum \$5) shipping and handling.

EDUCATIONAL DISCOUNTS: Additional discounts are available to qualified Educational Institutions.

APD & FPD: Add 3% (minimum \$5) shipping and handling.

CIRCLE 116 ON READER SERVICE CARD



It is easy now to translate this outline from English directly into Basic. Here is the final version of HINT:

```

800 'SUB HINT
810   IF S$ < G$ THEN 850
820   'FALSE
830   PRINT "LATER THAN"; G$
840   GOTO 870
850   'TRUE
860   PRINT "EARLIER THAN"; G$
870   'END IF
880   RETURN

```

Like the other subroutines, this one can also be tested in the immediate mode. Entering the statements, LET S\$ = "CAT", LET G\$ = "DOG", and GOSUB 800, should produce the hint EARLIER THAN DOG. After that, entering the statements

**Programs in this form are
especially easy to work with
on a CRT display.**

LET G\$ = "BEE" and GOSUB 800, should yield the hint LATER THAN BEE.

The Complete Program

Now all the routines have been planned, written, entered into the computer, and fully tested *independently* of one another. The only thing left is to confirm that all the parts work to-

gether correctly. We do that by typing RUN, entering a secret word, and then trying a sequence of guess words. Since all the parts have been tested, we expect the whole to work. It does. Here it is:

```

100 'PROGRAM GUESSING GAME
110   GOSUB 200 'SECRET WORD
120   GOSUB 400 'GUESS WORDS
130   GOSUB 600 'WRAP UP
140   END
150 '
200 'SUB SECRET WORD
210   CLS
220   PRINT "WHAT'S THE SECRET WORD";
230   INPUT S$
240   RETURN
250 '
400 'SUB GUESS WORDS
410   'LOOP
420   PRINT "WHAT'S YOUR GUESS";
430   INPUT G$
440   IF G$ = S$ THEN 500
450   GOSUB 800 'HINT
460   GOTO 410
470 'END LOOP
480   RETURN
490 '
600 'SUB WRAP UP
610   PRINT "YOU GOT IT!!!"
620   PRINT "THE WORD WAS"; S$
630   RETURN
640 '
800 'SUB HINT
810   IF S$ < G$ THEN 850
820   'FALSE
830   PRINT "LATER THAN"; G$
840   GOTO 870
850   'TRUE
860   PRINT "EARLIER THAN"; G$
870   'END IF
880   RETURN

```

There are a few noteworthy things about programs written in this structured form. First of all, they are practically self-documenting. The only remark statements used are there for structural reasons: to mark the beginnings of routines, the beginnings and endings of control blocks, and the TRUE and FALSE cases in the branch block. Copious explanatory remarks are missing because they are not needed.

Second, programs in this form are especially easy to work with on a CRT display. Limited screen size makes it impossible to see the entire listing of a long program. But if you need to find something in the listing of a long *structured* program, there is a simple and straight forward method. Begin by listing the first dozen or so lines, which contain the main routine. In the listing, each GOSUB contains a tail remark describing the purpose of the subroutine, *and* contains the line number at which the routine begins. Therefore, you can use the main routine as a "table of contents" for the whole program. And, by keeping each routine under 20 lines or so, you can list all its statements on your screen.

Most important of all, structured programs are easy to understand and, for that reason easy to modify and to maintain. That is the topic we turn to next.

Making Refinements

Step 5 of the top-down method is to make refinements to the program. No matter how much care and planning go into a



Computer Protection
KLEEN LINE®
CONDITIONER

Prevents:

- Computer Damage
- Lightning Spike Damage
- Brownout Interruptions
- Disruptive Line Noise
- Program Errors

Regulator • Filter • Suppressor

KLR-250A	250 Watt Load	\$291.95
KLR-250A-1S0	250 Watt Load; Patented Filter Isolated Sockets	\$346.95
KLR-500A	500 Watt Load	\$390.95
KLR-500A-1S0	500 Watt Load; Patented Filter Isolated Sockets	\$445.95

Shipping: \$12.75 Land; \$45.50 Air

Ask Your Local Dealer

ESP® Electronic Specialists, Inc.
 171 South Main Street, Box 389, Natick, Massachusetts 01760

Toll Free Order Desk 1-800-225-4876
 MasterCard, VISA, American Express



The Only Limit is the Boundaries of Your Imagination

Word Processing on red, Spreadsheets on
yellow and letters home to Mom on blue.

Brought to you by the people who provide quality software
duplication to the world's major software publishers.

Contact Allenbach Industries for the Kaleidiskette™ dealer nearest you.

KALEIDISKETTES™

Allenbach Industries, Inc., 2101 Las Palmas Drive, Carlsbad, CA 92008 (800) 854-1515 — (619) 438-2258

CIRCLE 196 ON READER SERVICE CARD

© 1984 Allenbach Industries

discwasher® **SpikeMaster**™

Surge Suppressor

Superior protection for your electronics

All electronic equipment needs protection. Computers, televisions and audio systems are all damaged by periodic electrical surges in standard wall current.

The Discwasher SpikeMaster is THE superior suppressor to protect your mega-dollars in equipment.

SpikeMaster incorporates these desirable features.

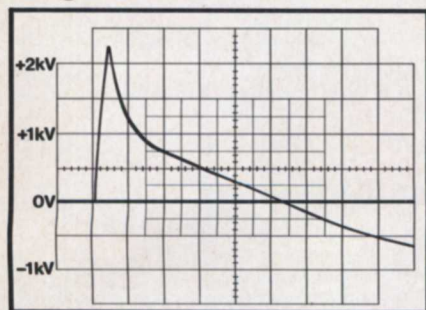
- Multimode suppression systems protect against fast rise time surges, absorbing high power surges quickly.
- Multistage suppression systems guarantee protection whether the "hot" wire, ground wire or both deliver destructive surges.
- RFI filtering isolates your equipment from interfering radio signals on the power line.

The heavy duty Discwasher SpikeMaster is attractively designed for home or office. SpikeMaster incorporates four widely spaced outlets, an on/off switch with indicator light and a 6 1/2 foot power cord.

Independent laboratory tests (to stringent I.E.E.E. standards) confirm that SpikeMaster out performs and out protects suppression devices costing twice as much.

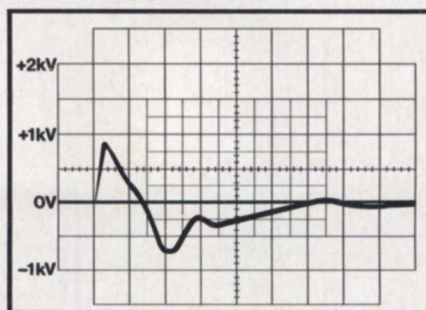
The following oscilloscope tracings measure a 1000 volt surge imposed onto a power line.

Surge



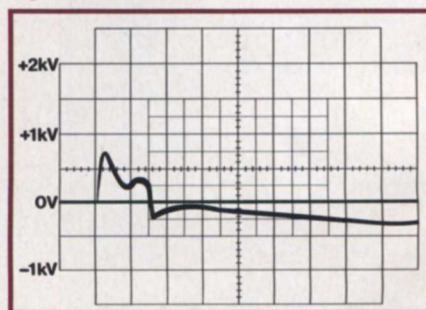
The unsuppressed surge reaches a peak of 2,200 volts.

\$150 suppressor



Protection from a unit costing over \$150 allows an 870 volt surge through the line with a 750 volt residual surge close behind.

SpikeMaster



SpikeMaster clamps the surge in 30 microseconds. WITH SPIKEMASTER, A LOWER PEAK VOLTAGE AND QUICKER RESPONSE TIME MEANS BETTER PROTECTION FOR ALL YOUR DELICATE ELECTRONIC EQUIPMENT.

discwasher

1407 North Providence Road, P.O. Box 6021, Dept. CC, Columbia, MO 65205 USA A DIVISION OF JENSEN an ESMARK Company

CIRCLE 182 ON READER SERVICE CARD

program, it seems always true that as soon as the program runs successfully, we discover changes and revisions that need to be made. In that sense, writing a program is like writing a paper or report: when we see the whole draft for the first time, we feel the need to revise and improve.

Structured programs lend themselves to easy revision, modification, and refinement. This fact becomes truly clear only when you see an example. Therefore, let's look at our GUESSING GAME program with a jaundiced eye and see what is wrong with the way it currently works. Here are a few problems that need fixing:

1. After someone enters the secret word, it stays on the screen. The game isn't much of a challenge if the player can look on the screen and see the answer.
2. If someone typed ANTIDISESTABLISHMENTARIANISM as the secret word, it might take a while for the player to guess it.
3. The guessing will go on forever if the player cannot find the secret word. Also, it might be more challenging to allow only a given number of guesses.

Let's see how to attack these problems. The first is easy: making the secret word disappear from the screen after it is entered. We begin by finding the place in the listing to make the change. When deciding what part of a structured program to look at or change, use the main routine as a directory. Here it is:

```
100 'PROGRAM GUESSING GAME
110   GOSUB 200 'SECRET WORD
120   GOSUB 400 'GUESS WORDS
130   GOSUB 600 'WRAP UP
140   END
```

You can see that subroutines GUESS WORDS and WRAP UP have nothing to do with getting the secret word. But subroutine SECRET WORD obviously does. Here is how it looks now:

```
200 'SUB SECRET WORD
210   CLS
220   PRINT "WHAT'S THE SECRET WORD";
230   INPUT $$
380   RETURN
```

When someone replies to the INPUT statement, the secret word stays on the screen. Getting rid of it is easy: Just put another clear-the-screen statement as line 240. The player must look away while the secret word is being typed, but afterward the word will disappear from the screen.

The second problem we need to solve is limiting the length of the secret word. Once again, we need to change subroutine SECRET WORD, and we can ignore the rest of the program. Here is how the routine now looks:

```
200 'SUB SECRET WORD
210   CLS
220   PRINT "WHAT'S THE SECRET WORD";
230   INPUT $$
240   CLS
380   RETURN
```

Let's change the subroutines so that if a secret word longer than three characters is entered, the computer will reject the word and ask for a shorter word. If the secret word is three or fewer characters, the game should begin.

As before, the *wrong* way to start is to plunge in with a patchwork of Basic statements. The *right* approach is to ask "What kind of block do I need to use? Is it an action, a loop, or a branch?" The clue lies in the fact that if one keeps entering words longer than three characters, the computer should keep asking for another word. As soon as the length is okay, the computer should stop asking. So we need a loop block.

The loop should begin after the first CLS statement and end before the second. Here is a bare-bones outline:

```
200 'SUB SECRET WORD
210   CLS
215   'LOOP
      do something
      IF exit-condition THEN 238
      do something
236   GOTO 215
238   'END LOOP
240   CLS
380   RETURN
```

The next step is to decide what the "do somethings" and the "exit-condition" should be. The first "do something" is easy: It is just an action block consisting of the present lines 220 and 230, which prompt for input and assign the input to \$\$. The "exit-condition" is that the length of \$\$ be three or less. The

The wrong way to start is to plunge in with a patchwork of Basic statements.

second "do something" needs to be a PRINT statement to prompt for a shorter secret word. Here is the final version of the loop:

```
200 'SUB SECRET WORD
210   CLS
215   'LOOP
220     PRINT "WHAT'S THE SECRET WORD";
230     INPUT $$
232     IF LEN ($$) ≤ 3 THEN 238
234     PRINT "TOO LONG"
236     GOTO 215
238   'END LOOP
240   CLS
380   RETURN
```

If the secret word has three characters or fewer, the computer now leaves the loop. If not, the computer goes on to line 234, and prints the TOO LONG prompt. Then the computer returns to the beginning of the loop.

Here is an important point to note: When we first planned subroutine SECRET WORD, it contained only an action block. With the improvement we just made, the subroutine now contains a loop with action blocks inside the loop. More often than not, program revisions mean fundamental changes in block structure. Thinking hard about block structure is the best way to avoid having a program end up looking like a patchwork quilt.

Now we can start thinking about the third problem: how to limit the number of guesses. First, we have to decide which program block should be changed. It certainly cannot be the SECRET WORD subroutine or the WRAP UP subroutine. That leaves only the GUESS WORDS subroutine. Here is how it now stands:

```
400 'SUB GUESS WORDS
410   'LOOP
420     PRINT "WHAT'S YOUR GUESS";
430     INPUT G$
440     IF G$ = $$ THEN 500
450     GOSUB 800 'HINT
490     GOTO 410
500   'END LOOP
580   RETURN
```

At present, the computer stops looping only when the guess is correct. We want the loop to stop when the guess is correct *or* when the player uses up the allowed number of guesses, so we need a *compound* condition in the IF statement. Let's use the variable C to count the number of guesses and agree to limit the guesses to 10. Then the exit-condition needs to be changed to this:

```
G$ = S$ OR C = 10
```

With this change, the IF statement now says to end the loop if C equals 10. But how does the computer know where to start counting? And how does it keep track of the number of guesses? We need two new statements. First, we must set the value of C to 1 (for the *first* guess) *outside* the loop. Second, we must have the computer add 1 to C each time through the loop. Here is the subroutine with the new IF statement and the statements that define and keep track of C.

```
400 'SUB GUESS WORDS
405   LET C = 1
410   'LOOP
420     PRINT "WHAT'S YOUR GUESS";
430     INPUT G$
440     IF G$ = S$ OR C = 10 THEN 500
450     GOSUB 800 'HINT
460     LET C = C + 1
490     GOTO 410
500   'END LOOP
580   RETURN
```

Here is another important thing to note: Even though the above loop depends on a counter that increases in steps of 1, it *cannot* be replaced by the FOR/NEXT shortcut. This is true because the exit-condition depends on *two* things: the value of the counter and the value of G\$. Trying to use a FOR/NEXT loop here would force us to use either a wild jump out of the loop or tricky manipulation of the loop variable. Using the general form of the loop block avoids these unstructured tactics and improves readability.

That might seem to wrap up the three changes we set out to make. However, the last change has created a new problem: subroutine WRAP UP gives a winning message whether or not the word was guessed. Here is how it reads now:

```
600 'SUB WRAP UP
610   PRINT "YOU GOT IT!!!"
620   PRINT "THE WORD WAS"; S$
780   RETURN
```

The body of the subroutine is now a single action block. What kind of block is needed to print *either* a winning message *or* a losing message? The branch block will do the job, and so we must change the basic structure from an action block to a branch block. Here is the WRAP UP subroutine with a bare-bones branch outline in lines 601 through 615:

```
600 'SUB WRAP UP
601   IF condition THEN 605
-----   'FALSE
-----   do something
-----   GOTO 615
605   'TRUE
610     PRINT "YOU GOT IT!!!"
615   'END IF
620   PRINT "THE WORD WAS"; S$
780   RETURN
```

Note that we have preserved lines 610 and 620 intact, but 610 is now inside the branch block. Now we must decide on the "condition" and the FALSE "do something." Since line 610 is the TRUE "do something," we want to get the congratulatory message when the "condition" is true. So the "condition" must be G\$ = S\$. Furthermore, the FALSE "do something" needs to

be a YOU LOSE message. Here is the complete branch:

```
600 'SUB WRAP UP
601   IF G$ = S$ THEN 605
602     'FALSE
603     PRINT "YOU LOSE"
604     GOTO 615
605     'TRUE
610     PRINT "YOU GOT IT!!!"
615   'END IF
620   PRINT "THE WORD WAS"; S$
780   RETURN
```

Now the branch block tells the computer to print YOU GOT IT!!! if G\$ = S\$; that is, if the guess is correct. If G\$ < > S\$, the computer prints the message YOU LOSE. Either way, the computer prints the secret word on the screen.

We have now finished planning, implementing, and refining

***Without ever using the crutch of
detailed flowcharts or hours
budgeted for brute force patching
and debugging, we got results.***

the GUESSING GAME program. When in the planning stage, we used the top-down method to break the task into small, meaningful units. When handling any problem in program logic, we needed to use only three formal control blocks: actions, loops, and branches. By adhering strictly to these principles of structured programming, we were able to produce a program that worked, that was easy to read, and that was easy to change. Without ever using the crutch of detailed flowcharts or hours budgeted for brute-force patching and debugging, we got results.

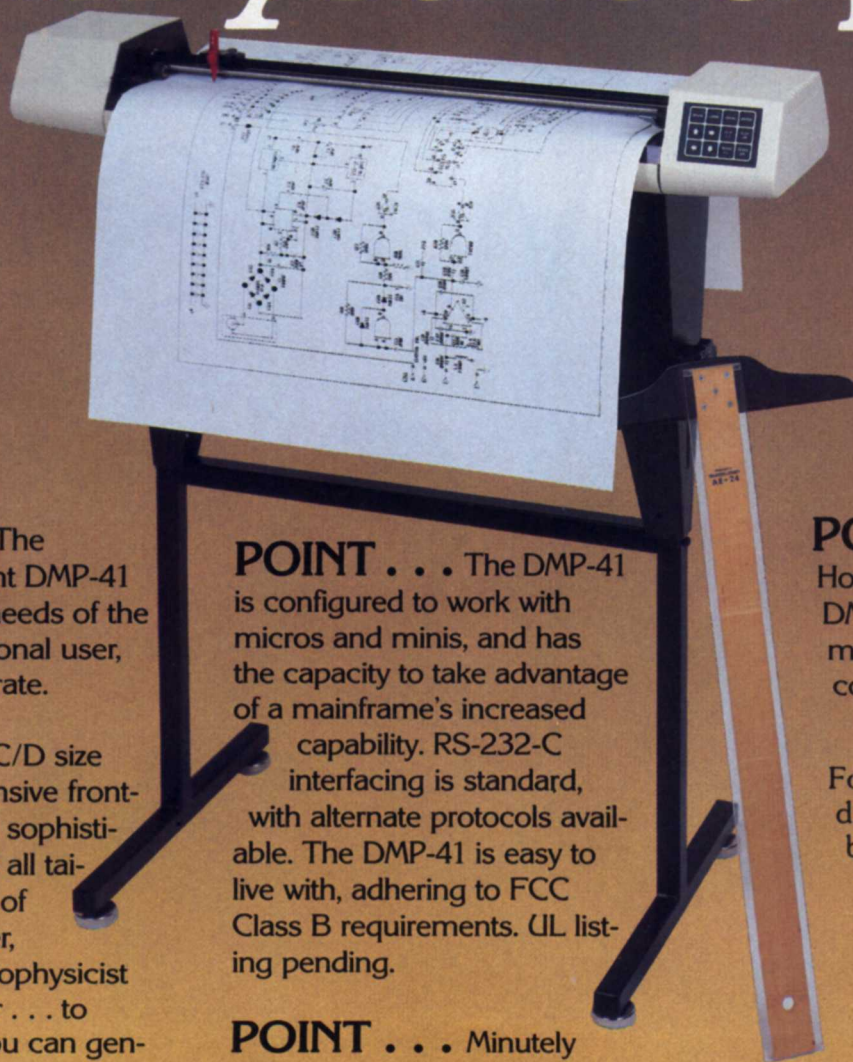
The programming task we set ourselves here was a very simple one, of course. It was picked to be a practical size for an article such as this, but also to exemplify a general approach to program development that will work for a task of any size. The method is easy to learn, easy to use, and easy to teach to others. Why and how it has been so successfully kept a secret from the community of Basic programmers for the past decade is hard to fathom.

Coming Next Month

The first three articles in this four-part series have introduced structured programming methods in a language with which most people are familiar: Basic as implemented on today's microcomputers. In these Basics, subroutines, loop blocks, and branch blocks need to be built up from scratch, using very primitive statements: GOSUB, RETURN, IF, and GOTO. Better Basics exist today, and still better ones are on the way, thanks mainly to the efforts of Committee X3J2 of the American National Standards Institute, whose task it is to propose a national standard for a modern version of Basic. In ANSI Basic, the full set of structured programming methods is built into the language. Next month's article will show how to write these fundamental structures in ANSI Basic. ED

The example discussed here is taken from Computer Literacy—A Hands-On Approach, by Luehrmann and Peckham (McGraw-Hill), which is intended as a school textbook. The same material is also available in a bookstore version called Computer Literacy Survival Kit, which includes a program diskette.

It's easy to make points when you're a pro.



POINT . . . The Houston Instrument DMP-41 plotter meets the needs of the serious or professional user, yet it's easy to operate.

POINT . . . C/D size format, comprehensive front-panel controls and sophisticated firmware are all tailored to the needs of the surveyor, drafter, oceanographer, geophysicist and land developer . . . to name but a few. You can generate superior architectural elevations, contour maps, circuit-board layouts and assembly drawings quickly and accurately on bond, vellum or synthetic media.

POINT . . . The DMP-41 is configured to work with micros and minis, and has the capacity to take advantage of a mainframe's increased capability. RS-232-C interfacing is standard, with alternate protocols available. The DMP-41 is easy to live with, adhering to FCC Class B requirements. UL listing pending.

POINT . . . Minutely defined step size and high-resolution logic—combined with robust drives and optimized pen ballistics enable you to create plots of high precision and surpassing quality.

POINT . . . The Houston Instrument DMP-41 is one of your most cost effective considerations.*

For the name, address and phone number of your nearest representative, write Houston Instrument, P.O. Box 15720, Austin, TX 78761. Phone 512-835-0900, or

800-531-5205 if outside Texas. In Europe contact Houston Instrument Belgium NV., Rochesterlaan 6, 8240 Gistel, Belgium. Tel 059-27-74-45, tlx 846- 81399.

**houston
instrument**



*suggested US retail \$2,995

CIRCLE 132 ON READER SERVICE CARD

How to get from Sesame St. to Wall St.



Now your whole family can be on the road to success — with CBS Software.

You see, making you the best is what CBS Software is all about. We know that by putting the best thinking into our software, you'll get the best out of it.

So all of our programs are designed by experts in their fields.

Our early learning programs are created by people like the Children's Television Workshop, developers of *Sesame Street*, *The Electric Company* and *3-2-1 Contact*.

We have music programs from the award-winning Dovetail Group. Elementary education programs created by top-notch teachers.

And college-prep programs endorsed by groups like the National Association of Secondary School Principals.

We also make software for grownups. Like our **MANAGING**

FOR SUCCESS™

series created by **THOUGHTWARE®**, leaders in computer-based management training. Or our leisure activities, created by people like Charles Goren, the world's foremost bridge authority.

You won't find it hard to get the best out of your computer. With CBS Software, you'll find you're on Easy Street.

While you may like all the experience that goes *into* CBS Software, you'll really like all the experiences you get *out* of it.

Little kids, for example, will have great fun with their lovable **SESAME STREET™** friends in programs like **BIG BIRD'S SPECIAL DELIVERY™**. But they'll also get great practice sorting shapes, colors and objects. Other Children's Television Workshop programs offer older kids a chance to explore, discover and win—by cooperating.

Another program, **DINOSAUR DIG™**, lets kids bring dinosaurs to life.



BIG BIRD
© Muppets, Inc.



And three different **JAZZ SCATS™** programs let kids bring their own tunes to life.

Of course, CBS Software isn't just for kids. We can help teenagers and adults get ahead in school and career, too. And we do it with programs that are more than

just "electronic books."

Our **SUCCESS WITH MATH™** series and **MASTERING THE SAT*** program are more like having a private coach to patiently coax out the very best in a student.

Our **MANAGING FOR SUCCESS™** series can help you make the very best of your managing skills at home and work. And our **MICROSPEEDREAD™** program can help make the best of your reading speed and comprehension.

And, finally,



we can help you make the best of your leisure time:

You can improve your bridge game. Test your powers of concentration. Or sharpen your deductive reasoning skills by solving some of the world's toughest crime capers.

It's all designed to help you be the very best you can be.

So whether you're headed for Sesame Street or Wall Street—or anywhere in-between—just remember one thing.

You're ahead with CBS Software.

Available for Apple® II+ /Ile, Iic, Atari®, Commodore 64™, IBM®-PC and PCjr.

**CBS
SOFTWARE**

Making you the best.

Here's
\$5.00
to pave
the way!

Fill out this coupon and mail with the customer information card and proof of purchase card found in every CBS Software pack along with your cash register receipt dated after June 15, 1984 or before October 31, 1984 with the CBS product price circled.

Enclosed is one proof of purchase plus my dated circled cash register receipt. Please send my cash rebate to:

Name _____

Address _____

City _____ State _____ Zip _____

This original coupon may not be reproduced and must accompany any rebate request. Offer limited to one per family. Allow 4-6 weeks for delivery. Void where prohibited, taxed or restricted by law.

Send to CBS Software Rebate Offer, PO Box 4147, Syosset, NY, 11791

In Canada, contact Holt, Rinehart and Winston at (416) 255-4491.
© 1984 CBS Inc. CBS Software, A Unit of CBS Inc., One Fawcett Place, Greenwich, CT 06836. (203) 622-2525. © 1984 Children's Television Workshop, Inc. SESAME STREET is a trademark and service mark of Children's Television Workshop. BIG BIRD is a trademark of Muppets, Inc. JAZZ SCATS is a trademark of the Dovecot Group, Inc. THOUGHTWARE is a registered trademark of the Institute for Management Improvement. "Apple", "Atari", and "IBM" are registered trademarks of Apple Computer, Inc., Atari, Inc. and International Business Machines Corp., respectively. "Commodore 64" is a trademark of Commodore Electronics Ltd. "SAT" is a registered trademark of the College Entrance Examination Board. This program has been prepared by CBS Software and the NASSP which bear sole responsibility for its contents.

CIRCLE 183 ON READER SERVICE CARD

ANNOUNCING CREATIVE COMPUTING's 1984

BUYER'S GUIDE

TO PERSONAL COMPUTERS & PERIPHERALS

ADVICE YOU CAN TRUST ON SELECTING PERSONAL COMPUTERS, PERIPHERALS AND ELECTRONIC GAMES

Unless you have the memory of a computer there's no way you can keep track of all the games, programs and peripherals available for your computer. And even if you could, you'd still have a problem figuring out what's best for your needs and how to get the most for your money.

That's why you need the *1984 Buyer's Guide to Personal Computers & Peripherals*. It's a comprehensive collection of product reviews and consumer-oriented shopping advice put together by the experts at *Creative Computing* magazine.

You'll get a rundown of what's new on the market. Analysis of new product performance, reliability, operation, applications, cost—even what kind of repair service you can

expect. Easy-to-understand comparisons between different models. Tips on bugs and design problems. Plus "inside" information you won't get from manuals or sales people.

Plug into the *1984 Buyer's Guide to Personal Computers & Peripherals* and find out what's hot in...

- ☐ Personal computers
- ☐ Pocket-sized computers
- ☐ Telecomputers
- ☐ Disk drives
- ☐ Memory expanders
- ☐ Word processors
- ☐ Dot matrix printers
- ☐ Electronic games
- ☐ Video game cartridges
- ☐ Joysticks and paddles
- ☐ Game port extenders
- ☐ Color graphics boards
- ☐ Speech synthesizers
- ☐ Do-it-yourself kits
- ☐ And more

You may even discover that you need *less* equipment than you think. The *1984 Buyer's Guide to Personal Computers & Peripherals* helps you avoid overbuying by showing you how to customize your current system.

What else does the *1984 Buyer's Guide to Personal Computers & Peripherals* give you? Book reviews, glossaries of new terms, evaluations of batteries for electronic games and calculators, and lots of other useful information.

Don't buy until you've consulted the *1984 Buyer's Guide to Personal Computers & Peripherals*! Order your copy today.



Send to: **Creative Computing Buyer's Guide**
CN 1914, Morristown, NJ 07960

MD9F

Yes! Please rush me Creative Computing's *1984 Buyer's Guide to Personal Computers & Peripherals*. Enclosed is my check or money order for \$3.95 plus \$1 for postage and handling.

Mr./Mrs./Ms. _____ (please print)

Address _____

City _____

State _____ Zip _____

Please make check payable to Creative Computing Buyer's Guide. CA, NJ and NY State residents please add applicable sales tax. Price outside U.S.A. is \$6.

Going Around, Under And Through Circles: Mathematics and Computer Art

Part 3

Sheldon P. and Florence S. Gordon

In two previous articles, we have discussed the properties of some strange and fascinating mathematical curves known as hypocycloids and epicycloids. In both cases, we started with a large circle of radius A and a smaller circle of radius B. To form a hypocycloid, we traced out the path traversed by a fixed point on the smaller circle as it rolls around the inside of the large circle. (See Figure 1.) To form an epicycloid, we traced out the path formed by a fixed point on the smaller circle as it rolls around the outside of the larger circle. (See Figure 2.)

In each case, the use of computer graphics allowed us to discover some remarkable properties of these curves while at the same time generating some lovely and artistic patterns and shapes.

Both of these types of curves were

originally discovered because of a characteristic outlook of mathematicians—the type of curiosity that is always asking “What happens if...?” For example: what happens to a point on a circle rolling around another circle? The answer to such a question was a major project for the mathematicians of the ancient world. With the aid of the mod-

as it rolls around the outside of a larger circle. But, what happens if the rolling outer circle is actually larger than the inner circle?

The picture we had in the previous article on the epicycloid (*Creative Computing*, June 1984) were generated by a graphics program which drew the graphs of the curve given by the two parametric equations:

$$X = (A+B) \cos(T) - B \cos((A+B)T/B)$$

$$Y = (A+B) \sin(T) - B \sin((A+B)T/B)$$

In these expressions, B is the radius of the rolling outer circle, and A is the radius of the fixed inner circle. The program doesn't care what A and B stand for; it just plugs their values into the two formulas, calculates the location of the (X,Y) point, and graphs it. Therefore, we can supply any values for A and B to the computer that we want. For instance, we can let B = 2 and A = 1. The result is the heart shaped curve shown in Figure 3. Similarly, if B = 3 and A = 1, we obtain the result in Figure 4. Further, if B = 4 and A = 1, we get the epicycloid shown in Figure 5.

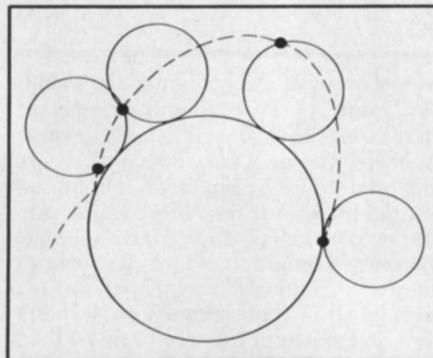


Figure 2. Generating an epicycloid.

ern computer, though, we can answer the same question in seconds, generate far more details, and observe interesting relationships.

In this article, we will look at several further possibilities relating to epicycloids and hypocycloids and see some more mathematical patterns as well as the artistic shapes that result.

The Epicycloid Reconsidered

First, let's consider the epicycloid again. We said that it is formed by tracing the path of a fixed point on a circle

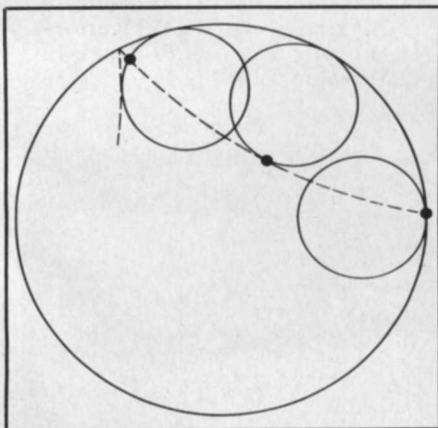
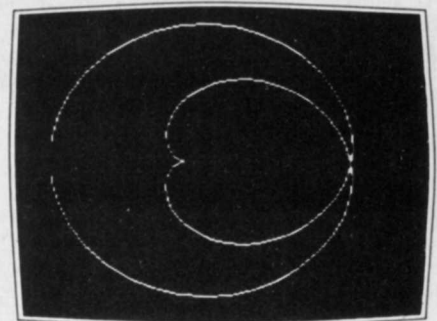


Figure 1. Generating a hypocycloid.

Figure 3.



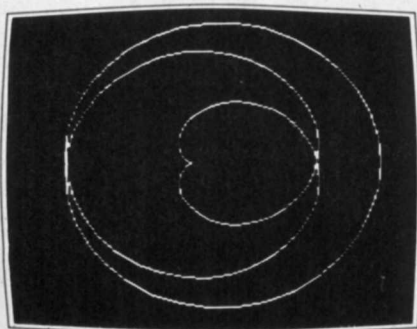


Figure 4.

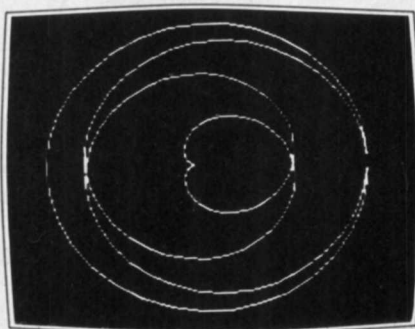


Figure 5.

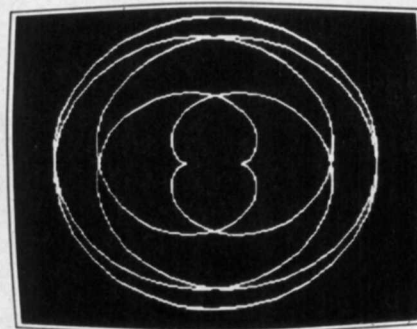


Figure 6.

Those of you who have read the previous articles in this series are undoubtedly already counting the number of arches and cusps (the sharp points in the diagrams). It turns out that with all of these curves, the number of cusps is directly related to the values of the two radii. Thus, in Figure 3, there are two cusps and two arches corresponding to $B = 2$ and $A = 1$. In Figure 4, there are three cusps and arches with $B = 3$ and $A = 1$. Finally, in Figure 5, there are four cusps and arches with $B = 4$ and $A = 1$.

If instead you try $B = 5$ and $A = 2$, you obtain the shape shown in Figure 6. In this, there are five cusps and five interconnected arches. However, to complete the full curve requires that the rolling circle rotate through two full revolutions about the fixed inner circle. Similarly, if you use $B = 8$ and $A = 3$, the resulting shape will contain eight cusps, but will require three full revolutions about the inner circle, as shown in Figure 7. On the other hand, the shape for $B = 20$ and $A = 6$, as seen in Figure 8, looks exactly as you would by now expect for $B = 10$ and $A = 3$. The common factor of 2 in the radii 20 and 6 essentially is removed when forming the shape of the epicycloid.

All of these curves are perfectly realizable in the sense that a larger circle can roll around the outside of a smaller one. However, it is literally impossible for a larger circle to roll around inside a smaller one if we were to attempt the same type of extension with the hypo-

cycloid. It just can't be done physically or geometrically. But, what happens if we ignore the fact that this is impossible and proceed blithely to give the computer such values? The equations for a hypocycloid are:

$$X = (A-B) \cos(T) + B \cos((A-B)T/B)$$

$$Y = (A-B) \sin(T) - B \sin((A-B)T/B)$$

In these expressions, it is tacitly assumed that B is smaller than A . How-

**What happens if we
ignore the fact
that this is impossible
and proceed blithely
to give the
computer such values?**

ever, if we give the computer the values $B=2$ and $A=1$, it doesn't know that there is no physical significance to these numbers. It doesn't care that they are supposed to represent radii of circles. The computer just puts these values into the two formulas and grinds out the corresponding graph, which is shown in Figure 9. Similarly, the shapes for the pairs $(A,B) = (\text{outer, inner}) = (1,3)$ and $(1,4)$ are shown in Figures 10 and 11. In the last two graphs, you will probably notice that the center of each shape con-

tains the same heart shape as for the pair $(1,2)$. Similarly, the pairs $(1,5)$ and $(1,8)$ also contain this shape at the center surrounded by an ever increasing complexity of arcs. See Figures 12 and 13.

Now, let's look at the pair $(2,3)$, whose graph is shown in Figure 14. The pairs $(2,5)$ and $(2,7)$, as shown in Figures 15 and 16, contain the same central shape surrounded also by a variety of ever more complex arcs. Notice, by the way, that we skipped over the pairs $(2,4)$ and $(2,6)$ —they just reduce to the same shapes as $(1,2)$ and $(1,3)$ respectively.

Furthermore, all pairs having $A = 3$ will contain a spade shape at the center as shown in Figures 17 and 18 for the pairs $(3,5)$ and $(3,8)$ (assuming that there are no common factors to cancel and reduce the shape).

Mathematical Questions

Additional patterns for the shapes generated should be fairly predictable by now. However, there are several questions of a mathematical nature which are not easily answered. First and foremost, you have undoubtedly noticed that some of these last few figures of supposedly non-existent hypocycloids look amazingly like some of the earlier pictures of epicycloids. In particular, the matches are:

Epicycloid	Hypocycloid
$(1,2)$ Figure 3	$(1,3)$ Figure 10
$(1,3)$ Figure 4	$(1,4)$ Figure 11
$(1,4)$ Figure 5	$(1,5)$ Figure 12
$(2,5)$ Figure 6	$(2,7)$ Figure 16

Figure 7.

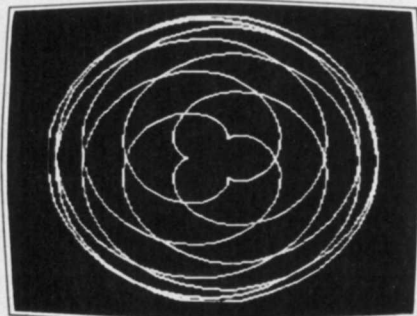


Figure 8.

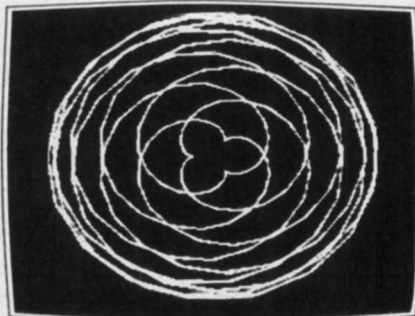
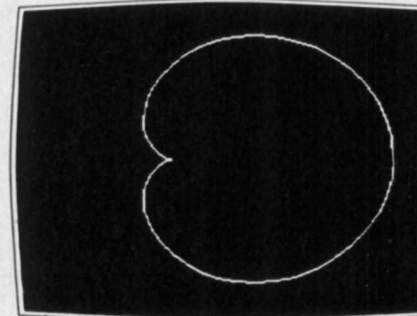


Figure 9.



INTRODUCING PINWRITER DOT MATRIX PRINTERS. AND A HEAD TO HEAD COMPARISON OF WHY THEY'RE BETTER.

Our new multi-mode Pinwriter® dot matrix printers have a lot in common with our Spinwriter® letter-quality printers. Designed and manufactured with the same quality and reliability that has made our Spinwriters the best selling letter-quality printers to PC users. We also gave them many unique capabilities you won't find on other dot matrix printers. Especially at such an affordable price.

More dots, more fonts, more versatility.

One thing that makes Pinwriters stand out from other



Our exclusive 18-pin print head is graphically sharper than a 9-pin printer, as this unretouched photo shows.

dot matrix printers is our printhead. It has 18 pins. Compared to the usual nine. It also has true dual-pass printing. The result: an amazing 240x240 dots per inch.

The quick brown fox

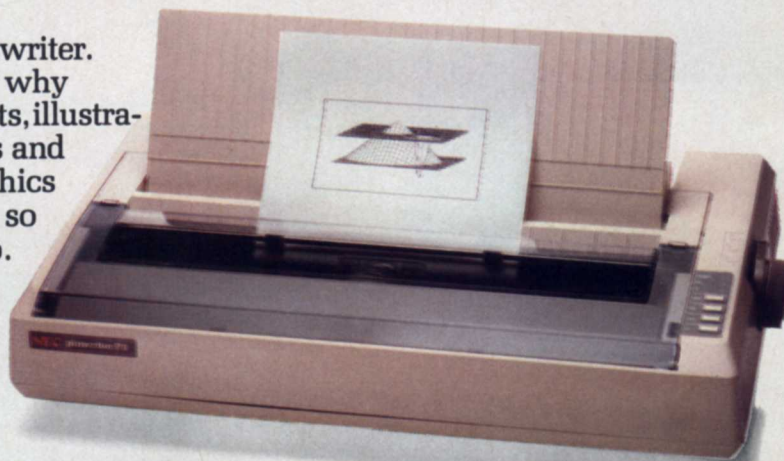
The quicker brown fox

The quickest brown fox

Three speeds cover all your printing needs.

That's why the print is as close to letter quality as you can get without getting a

Spinwriter. And why charts, illustrations and graphics look so crisp.



Our new P2 and P3 dot matrix printers give you everything our Spinwriter letter-quality printers are famous for, including forms handlers.

Pinwriters have something else no other dot matrix printers have. Eight operator-selectable print styles, plus as many as 11 international character sets. And an LED display to tell you which style has been selected.

What else? Three printing speeds. 300, 900 or 1800 words per minute to handle all your printing needs from word processing to data processing.

Plus, a variety of forms handlers to speed up all your paperwork. All made and designed by NEC. And all easily installed and changed by the operator.

For the final word, see your NEC dealer.

Only a demonstration can

Pinwriter and Spinwriter are registered trademarks of NEC Corporation.

show you how clearly superior the Pinwriter is compared to other dot matrix printers. And how versatile it is.

For the Pinwriter retailer nearest you, call 1-800-343-4419. In Massachusetts call 617-264-8635.

And find out why more and more PC users are saying, "NEC and me."

NEC AND ME

NEC Information Systems, Inc.
1414 Mass. Ave.
Boxborough, MA
01719



CIRCLE 190 ON READER SERVICE CARD

SAMS SPUD IS ONE HOT POTATO.

Sams SPUD is the 2 player game that's so fast, so challenging, one bite and you're hooked. From your fort, you fire three kinds of ammunition to move the bouncing SPUD, destroy your competitor, intercept shots, gain bonus points, and more. Also included is a bonus game MUG SHOT, in which 1 to 4 players test their shooting skills at one of eleven different playing speeds. Get two exciting games in one. SPUD/MUG SHOT, No. 26162, \$29.95.

Buy SPUD/MUG SHOT today! Visit your local Sams dealer or call OPERATOR 171 at 317-298-5566 or 800-428-SAMS.

by *Sams*™

Howard W. Sams & Co., Inc.
4300 West 62nd Street, P.O. Box 7092
Indianapolis, IN 46206

Available for any Apple® II compatible system with 48K, Applesoft in ROM, and 1 Disk Drive (DOS 3.3). Offer good in USA only. Prices and availability subject to change without notice. In Canada, contact Lenbrook Electronics, Markham, Ontario L3R 1H2. Apple is a registered trademark of Apple Computer, Inc.

SAMS APE ESCAPE BRINGS OUT THE ANIMAL IN YOU.

Introducing Sams APE ESCAPE, the fast-action game that will have you scaling tall buildings, riding balloons, avoiding hazards and evading capture at heights that would scare even King Kong.

The higher you climb, the faster the action. And with no end to the buildings, there's no end to the fun! Play APE ESCAPE alone or test your skill by trying to top someone else's best score. Either way, it's sure to bring out the animal in you!

APE ESCAPE, for any Apple® II-compatible system,

No. 26166, \$29.95.

Don't monkey around, buy APE ESCAPE today! Visit

**your local Sams dealer. Or
call Operator 171 at 317-
298-5566 or 800-428-SAMS**

Sams™

Howard W. Sams & Co., Inc.
4300 West 62nd Street, P.O. Box 7092
Indianapolis, IN 46206

Offer good in USA only. Prices subject to change without notice. In Canada, contact Lenbrook Electronics, Markham, Ontario L3R 1H2. Apple is a registered trademark of Apple Computer, Inc.

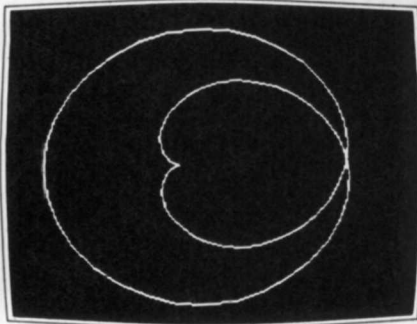


Figure 10.

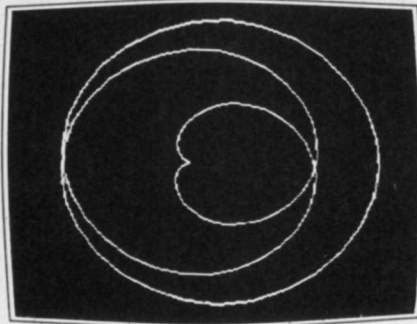


Figure 11.

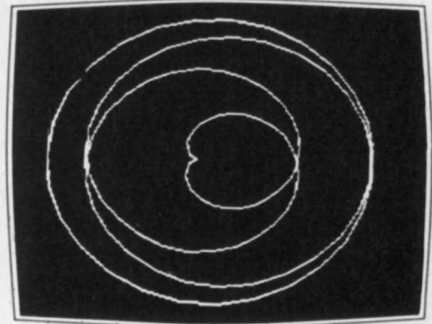


Figure 12.

What gives? To be honest, we reacted the same way when we began writing this article. The matching shapes are not something known to every mathematician. Remember, we did say at the beginning that computer graphics gives the mathematician the opportunity to learn new things about his subject. The above table does suggest some possible relationships, though. For example, the epicycloid with $(1,N)$ will probably give the same shape as the hypocycloid with $(1, N+1)$ for any integer N . (Is that true if N is negative? Hmmm.) But what about the epicycloid with $(2,5)$ versus the hypocycloid with $(2,7)$? For that matter, the epicycloid with $(3,8)$ is certainly related to the hypocycloids with $(3,5)$ and $(3,8)$, though neither one is quite identical. What value of N in the hypocycloid with $(3,N)$ will be the same as the epicycloid with $(3,8)$?

Further, what is the general pattern relating epicycloids and hypocycloids? We leave these points for the interested reader to ponder and answer by some judicious experimentation, with the appropriate programs. (These questions can also be answered using a fair amount of algebraic and trigonometric manipulation, but that approach is decidedly less exciting.)

There are some other open questions regarding these curves that are also worth considering. In the previous situations, there was a clear relationship between the number of cusps and arches and the values for the radii. In the current case, there does not seem to be an

obvious connection. Can you deduce such relationships? For that matter, is there any connection between the radii or the number of arcs and the number of points of intersections between the arcs? Answer these questions and you will be well on your way to becoming a true mathematician.

What makes these shapes even more interesting is watching how they are actually formed by the computer. When you look at the finished products, you

***What makes these
shapes even more
interesting
is watching how they
are actually formed
by the computer.***

might come to the conclusion that the inner shape is formed first and then the outer loops are traced out around it. This is not at all the case. Rather, the curves loop around repeatedly and, on each revolution, contribute a small portion to the central figure. It is only as the full diagram is completed that the central figure is completed as well.

The Programs

To get a feel for this, it is almost essential that you run the actual pro-

grams. Therefore, we have included here simplified listings that will enable you to produce all of these non-existent curves. The programs are designed for the TRS-80 Color Computer with Extended Basic; however, it is fairly easy to modify them to function on most other small computers with graphics capabilities. From that point on, you can interpret the results either as a series of intriguing and artistic shapes or as a challenge to discover some new mathematical principles.

If you chose the first alternative, then a limitation in the programs will allow you to generate even more striking artistic effects. To produce the graphs relatively quickly, the programs use a maximum of 400 subdivisions of the full curve. When the sizes of the radii are relatively large, however, the programs generate only approximations of the correct curve. These approximations can produce some truly remarkable shapes, as demonstrated in Figures 19, 20 and 21 for the pairs of radii (1000,5000), (2500,10000) and (2222,8888).

What is even more dramatic is the dynamic way in which all of these pictures are generated on the computer. In an article such as this, it is simply impossible to include all (or even any) of the strikingly beautiful intermediate stages that are produced on the screen on the way to creating the final figures shown. That is something that really must be experienced. Further, it is an experience that can be reproduced at the push of a button. 20

Figure 13.

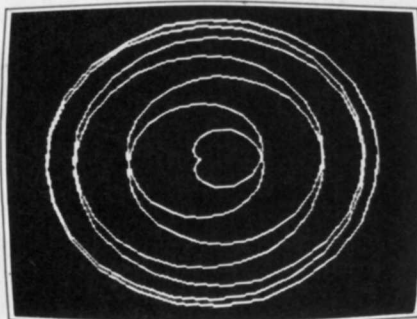


Figure 14.

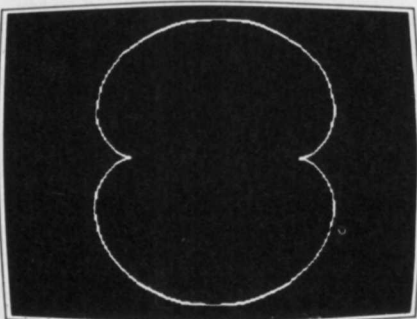
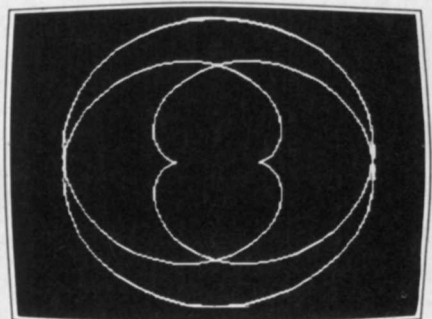


Figure 15.



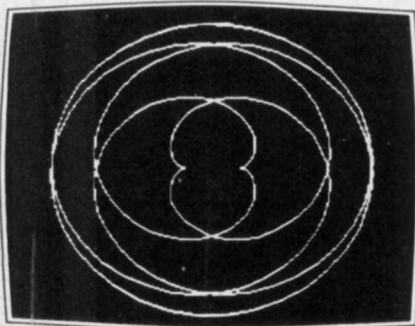


Figure 16.

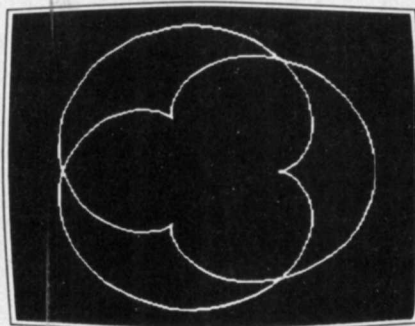


Figure 17.

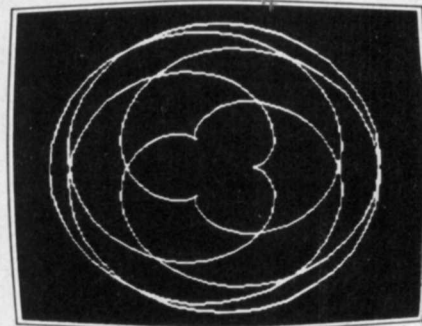


Figure 18.

Listing 1. Hypocycloid Plot.

```

10 PMODE 4,1
20 SCREEN 0,0
30 CLS
40 PRINT:PRINT:PRINT
50 PRINT "      THIS PROGRAM GRAPHS "
60 PRINT
70 PRINT "      ANY HYPOCYCLOID"
80 PRINT:PRINT:PRINT
90 PRINT "PROGRAM WRITTEN BY FLORENCE AND
      SHELDON GORDON"
100 PRINT:PRINT "      COPYRIGHT 1984
110 FOR T = 0 TO 1200 : NEXT T
120 CLS
130 PRINT:PRINT:PRINT
140 INPUT "WHAT IS THE LARGE RADIUS";AA:PRINT
150 INPUT "WHAT IS THE SMALL RADIUS";BB
160 C1=AA-BB
170 C2=C1/BB
180 DEF FN(X)=C1*COS(T) + BB*COS(C2*T)
190 DEF FNY(T)=C1*SIN(T)-BB*SIN(C2*T)
200 A=0:B=6.28*BB
210 IF BB<=AA THEN N1=-AA:N2=AA
220 IF BB>AA THEN N1=-AA-2*BB:N2=-N1
230 M1=N1:M2=N2
240 D=(N2-N1)/255:E=(M2-M1)/191
250 PCLS
260 NR=20*(AA+BB)
270 IF NR>400 THEN NR=400
280 REM DRAW GRAPH
290 SCREEN 1,1
300 H=INT((FN(X)-N1)/D+.5)
310 V=191-INT((FNY(A)-M1)/E+.5)
320 LINE(H,V)-(H,V),PSET
330 ST=(B-A)/NR
340 FOR T=A+ST TO B STEP ST
350 X=FN(X)
360 H=INT((X-N1)/D+.5)
370 Y=FNY(T)
380 V=191-INT((Y-M1)/E+.5)
390 LINE-(H,V),PSET
400 NEXT T
410 SOUND 100,10
420 GOTO 420
430 END

```

Figure 19.

Listing 2. Epicycloid Plot.

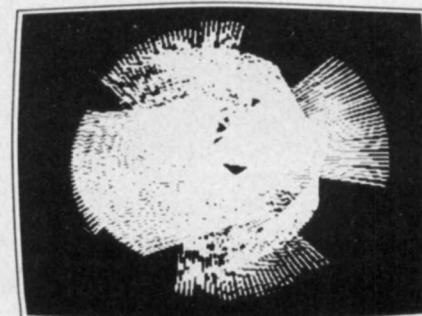
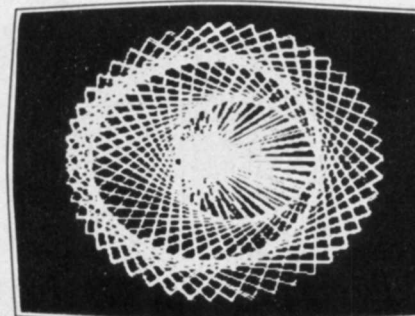
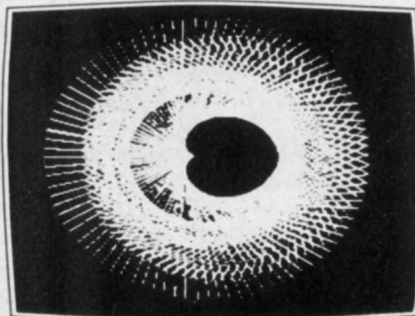
```

10 PMODE 4,1
20 SCREEN 0,0
30 CLS
40 PRINT:PRINT:PRINT
50 PRINT "      THIS PROGRAM GRAPHS "
60 PRINT
70 PRINT "      ANY EPICYCLOID"
80 PRINT:PRINT:PRINT
90 PRINT "PROGRAM WRITTEN BY FLORENCE AND
      SHELDON GORDON"
100 PRINT:PRINT "      COPYRIGHT 1984
110 FOR T = 0 TO 1200 : NEXT T
120 CLS
130 PRINT:PRINT:PRINT
140 INPUT "WHAT IS THE LARGE RADIUS";AA:PRINT
150 INPUT "WHAT IS THE SMALL RADIUS";BB
160 C1=AA+BB
170 C2=C1/BB
180 DEF FN(X)=C1*COS(T) - BB*COS(C2*T)
190 DEF FNY(T)=C1*SIN(T)-BB*SIN(C2*T)
200 A=0:B=6.28*BB
210 N1=-AA-2*BB:N2=-N1
220 M1=N1:M2=N2
230 D=(N2-N1)/255:E=(M2-M1)/191
240 PCLS
250 NR=25*(AA+BB)
260 IF NR>400 THEN NR=401
270 REM DRAW GRAPH
280 SCREEN 1,1
290 H=INT((FN(X)-N1)/D+.5)
300 V=191-INT((FNY(A)-M1)/E+.5)
310 LINE(H,V)-(H,V),PSET
320 ST=(B-A)/NR
330 FOR T=A+ST TO B STEP ST
340 X=FN(X)
350 H=INT((X-N1)/D+.5)
360 Y=FNY(T)
370 V=191-INT((Y-M1)/E+.5)
380 LINE-(H,V),PSET
390 NEXT T
400 SOUND 100,10
410 GOTO 410
420 END

```

Figure 20.

Figure 21.



creative computing

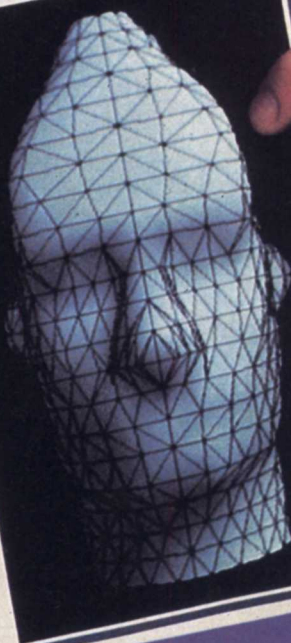
the #1 magazine of computer applications and software

In-Depth Evaluations:

- Kaypro 10
- Casio FX-700P
- Quadlink
- Koalapak
- Pixy Plotter
- Percom TI Disk Drive
- Apple Mechanic
- The Tool
- DiversiDOS
- XEdit
- Memory / Shift
- MULE
- Witness and Planetfall
- Games for TS 1000
- Arcademic Learning Series
- Spacediscs
- Controller Update
- High Precision Functions in Basic
- CBasic Clinic
- Basic Debugging
- Input Line Editor
- Plotting Tutorial
- Preventive Maintenance Primer

December 1983
Vol. 9, No. 12
\$2.95

Programming Techniques



SOFTWARE TO STIMULATE

Stimulate your mind every month with the #1 magazine of computer applications and software...CREATIVE COMPUTING! There is no other magazine like CREATIVE COMPUTING... WE TALK YOUR LANGUAGE!... Any make...any model...whether it's Apple, IBM, Radio Shack, TI, Mattel, Atari, Commodore...CREATIVE COMPUTING has monthly departments and articles you can use! You will receive a continuing education on *everything* related to personal computing with intriguing and useful applications for your personal computer. This is a magazine that will help you get more out of your computer—versatility, function and enjoyment—in easy-to-read and fully illustrated articles!

Subscribe to CREATIVE COMPUTING today and save up to 26%!

YES

FREE
10th ANNIVERSARY
LCD QUARTZ CLOCK
WITH PAID
SUBSCRIPTION

creative computing

P.O. Box 5214, Boulder, Colorado 80322

Please enter my subscription to CREATIVE COMPUTING for:

- | | | |
|-----------------------------------|------------------------------------|------------------------------------|
| <input type="checkbox"/> 8 issues | <input type="checkbox"/> 12 issues | <input type="checkbox"/> 24 issues |
| \$13.97. | (One year) \$19.97. | \$36.97. |
| I SAVE 16%! | I SAVE 20%! | I SAVE 26%! |

Mr/Mrs/Ms _____ (please print name in full)

Company _____ CC4S317

Address _____

City _____ State _____ Zip _____

Check one: ☐ Payment enclosed ☐ Bill me later

Charge my: ☐ American Express ☐ Visa ☐ MasterCard

Card No. _____ Exp. Date _____

Savings based on full one-year subscription price of \$24.97.

Please add \$5 per year in Canada, \$10 per year in all foreign countries.

Please allow 30 to 60 days for delivery of first issue.

Plotting and Graphics Tutorial

THE SIERPINSKI CURVE: A LESSON IN DEBUGGING AND CONVERSION

David H. Ahl

In several recent tutorials, I promised to publish a routine for plotting the Sierpinski curve, one of the most fascinating curves in mathematics (see box). I had seen several ways of approaching the problem, but by far the most elegant was a demonstration program on a NEC 8801 computer which used the N. Wirth algorithm.

I managed to get a listing of the relevant portion of the program, but upon examining it more closely, I realized that it employed several statements with which I was unfamiliar. Several were minor variations of statements in MSX Basic, but `LINE -STEP (H,H)` and its variants really had me stumped (see lines 7370-7400 in Listing 1). To make matters worse, I had no way of easily obtaining the Basic manual for the system. Moreover,

Listing 1. Statements from original NEC program.

```

7300 '-- display routine --
7310 *SIERPIN
7320 H0=512:SP=0:H=H0\4:X=2*H:Y=3*H:I=0
7330 I=I+1:X=X-H:H=H\2:Y=Y+H
7340 IF I<D1 THEN 7330
7350 POINT(X,Y):COLOR,,,COL
7360 PSVAL=I:GOSUB *PUSH
7370 GOSUB *SUBAA:LINE -STEP(H,-H)
7380 GOSUB *SUBBB:LINE -STEP(-H,-H)
7390 GOSUB *SUBCC:LINE -STEP(-H,H)
7400 GOSUB *SUBDD:LINE -STEP(H,H)
7410 GOSUB *POP
7420 RETURN
7430 '
7440 *SUBAA

```

the five books I had on MBasic had no description of the graphics commands (see box).



COMPUTER DISCOUNT PRODUCTS

HUGE Inventories • APPLE-IBM Specialists

★ ASK ABOUT OUR FAIR PRICE POLICY - IT'S GUARANTEED! ★



Additional
10% OFF
Your Order Of
Any FIVE
Educational
Programs
School P.O.'s!
See Below

CDP SPECIALS

16K UPGRADE 4116 200 NS	9.99
64K UPGRADE 4164 200 NS (Set/9)	79.99
APPLE FAN w/Surge, 2 Outlets	39.99
PAR. PRINTER CARD & CABLE	39.99
16K RAM CARD	39.99
POWER STRIP w/Surge	17.99
3-RING BINDER DISK SHEET (10)	7.99

DISKETTES

DYSAN 5" 5DD (10)	31.99
DYSAN 5" 5DD (10)	38.99
MAXELL 5" 5DD (10)	27.99
MAXELL 5" 5DD (10)	37.99
VERBATIM 5" 5DD (10)	24.99
VERBATIM 5" 5DD (10)	36.99
MEMOREX 3 1/2" (MAC)	41.99

SHARPEN YOUR SKILLS THIS SUMMER!

ALGEBRA I-III, Ap	31.99
ALGEBRA I, IBM	34.99
FLIGHT SIM II, Ap	37.99
FLIGHT SIM, IBM	34.99
FRACTION FEVER, Ap/IBM	21.99
MASTERTYPE, Ap	29.99
MASTERTYPE, IBM	34.99



SPINNAKER

FOR APPLE & IBM

ALPHABET ZOO	19.99
DELTA DRAWING	32.99
FACE MAKER	21.99
HEY DIDDLE	19.99
KINDERCOMP	19.99
MOST AMAZING THING	26.99
RHYME & RIDDLE	19.99
SNOOPER TROOPS I & II	27.99
STORY MACHINE	21.99

APPLE SOFTWARE

BPI (GL, AP, AR, PAY, INV)	ea289.99
BRODERBUND Arcade Machine	39.99
Bank Street Writer	44.99
Drol, Loderunner	ea24.99
CENTRAL POINT Copy II +	25.99
DLM Alien Addition	27.99
Alligator Mix	27.99
Demolition Division	27.99
Dragon Mix	27.99
Meteor Multiplication	27.99
Minus Mission	27.99
Verb Viper/Word Invasion	ea37.99
Word Radar/Spelling Wiz	ea37.99
EDUWARE Counting Bee	23.99
Decimals/Fractions 3.0	ea39.99
Hands on Basic	61.99
PSAT Word Attack	39.99
SAT Word Attack	39.99
JACK REPORT	74.99
KENSINGTON Format II	119.99
KOALA Spider Ester New!	23.99
LEARNING CD Bumble Games	26.99
Bumble Plot/Magic Spell	ea26.99
Gertrudes Puzzle/Secret	ea29.99
Moptown Parade/Hotel	ea26.99
Rocky's Boots	34.99
MICROLAB Miner 20-49er	27.99
MICROSOFT Multitap	165.99
QOESTA Chess	45.99
Odin	37.99
PFS Report	89.99
File	99.99
Graph	99.99
Write	99.99
SENSIBLE SPELLER	87.99
SUBLOGIC Night Mss. Pinball	32.99
ULTIMA III	39.99
DOLLARS & SENSE (Ile/c)	79.99

ACCESSORIES

FLIP'N FILE (original)	17.99
FLIP'N FILE w/Locktray (25)	17.99
FLIP'N FILE w/Locktray (50)	27.99
HAYES 300 Baud Smartmodem	199.99
1200 Baud Smartmodem	474.99
LIBRARY CASE	1.99
KENSINGTON PC Saver	2.99
PRINTERS C-TOH	379.99
Epson FX80	549.99
Epson RX80	349.99
Okidata B2-93	\$CALL
PRINTER STAND Sm. (plxgls)	24.99
PRINTER STAND Lg. (plxgls)	29.99
RIBBONS-Brother	\$CALL
MX & FX 80	4.99
MX & FX 100	7.99
OKI 82, 83, 92, 93 & Gemini	2.99
FINGERPRINT: Epson Upgrade	
RX, FX, MX	44.99

IBM

1/2 Height DS/DD Drive	239.99
ALPHA Typelaces	79.99
ASHTON TATE dBase II	399.99
Friday	184.99
Encyclopedia	59.99
AST Mega Plus	299.99
Six Pack Plus	279.99
BRODERBUND Serpentine	26.99
Lode Runner	24.99
CAI Masters	ea31.99
Subjects	ea16.99
CENTRAL POINT Copy II PC	25.99
CROSSTALK	139.99
HAYDEN Piewriter	129.99
HAYES 1200B Modem	439.99
KRAFT Joystick	44.99
LIFETREE Volkswriter	119.99
LOTUS 1-2-3	\$CALL
MICROLAB Miner 20-49er	27.99
MICROSOFT Mouse	129.99
Multitap	165.99
MONOGRAM Dollars & Sense	129.99
NORTON Utilities	55.99
PC CRAYON	49.99
Tutor	47.99
PFS Write	99.99
File	99.99
Report	89.99
Graph	99.99
POOL 1.5	27.99
SIERRA ON-LINE Frogger	26.99
SIR-TECH Wizardry	44.99
SUBLOGIC Night Mss. Pinball	32.99
TG Joystick	44.99
TITAN 64K BOARD	499.99
VISICORP. Visicalc	164.99
Schedule,	ea199.99
PLANTRONICS ColorPlus	375.99

Beagle Bros Micro Software Inc.

ALPHA PLOT	24.99
APPLE MECH., FLEX TEXT	ea19.99
BEAGLE BASIC, DOUBLE TAKE	ea24.99
DOS BOSS	15.99
FRAME-UP	16.99
GPLE	32.99
PRONTO DOS	19.99
TIP DISK #1	14.99
TYPEFACES	14.99
UTILITY CITY	19.99

Continental

APPLE GRAPHICS BOOK	14.99
CPA (GL, AP, AR, PAY/AP)	ea149.99
FCMFL 1st CLASS MAIL (AP)	99.99
FCMFL 1st CLASS MAIL (IBM)	71.99
HOME ACCOUNTANT (AP)	44.99
HOME ACCOUNTANT + (IBM)	84.99
PROPERTY MGMT. (AP, IBM)	295.99
TAX ADVANTAGE (Ap)	39.99
TAX ADVANTAGE (IBM)	49.99

ULTRAFIL (IBM) 155.99

KENSINGTON MICROWARE



SYSTEM SAVER

- Surge Suppression
 - Fits Apple Stand
 - Dual Outlet
 - U.L. Listed
- \$65**

INFOCOM

DEADLINE ENCHANTER	ea32.99
PLANETFALL	32.99
SUSPENDED	32.99
WITNESS	32.99
ZORK I-III/STARCROSS	ea24.99
SORCERER NEW!	37.99

APPLE HARDWARE

ALS CPM 3.0	259.99
AUTO REPEAT KEY	19.99
BASIS 108	\$CALL
DAN PAYMAR Lower Case 1 (rev 1-6)	25.99
Lower Case 2 (rev 7)	19.99
DARK STAR Snapshot II	65.99
EASTSIDE Wildcard	79.99
Wildcard II	111.99
FOURTH DIMENSION Drive	219.99
HAYES Micromodem Ite	235.99
KOALA PAD	85.99
KRAFT Joystick	44.99
Paddles	31.99
LEGEND 128K Ram	359.99
MICRO-SCI A-2 Drive	209.99
MOUNTAIN Ramplus + 32K	159.99
ORANGE MICRO Grappler +	114.99
Bufferboard	179.99
Buffered Grappler +	179.99
PADDLE ADAPPLE	24.99
TITAN TECH 128K Ram	379.99
Accelerator II	444.99
Neptune 64K	199.99
TG Joystick	34.99
Paddles	25.99

QUADRAM

APIC (APPLE III PARALLEL)	129.99
eRAM 80 column 64K IIE	\$CALL
MICROFAZER 8K Parallel	139.99
MICROFAZER 8K Serial	159.99
QUADBOARD I or II (64K)	269.99
QUADCOLOR I	209.99
QUADCOLOR II (Board For Above)	219.99
QUAD 512 + (64K)	219.99

QUADLINK 479.99

Videx

ENHANCER II	99.99
FUNCTION STRIP	34.99
HARDSWITCH	16.99
MICROMODEM CHIP	24.99
PSID	169.99
PRE-BOOTS Apple Writer	14.99
Apple Writer for Ultratrim	23.99
Visicalc	39.99
Visicalc/Memory Expansion	71.99
Visicalc for Ultratrim	54.99
SOFTSWITCH	25.99
ULTRAPLAN	\$CALL
ULTRATERM	249.99
VIDEOTERM w/ISS + INV	219.99

CDP is Your AUTHORIZED MicroPro. DEALER!

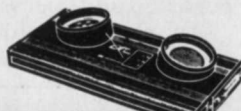
This month We'll Match Any Published Price
Same Terms - At Time Of Order
This Issue Only \$CALL

MONITORS

PRINCETON RGB HX-12	485.99
TAKAN 420 RGB	499.99
USI P1 9" Green 20 mh	99.99
USI P1 12" Green 20 mh	119.99
USI P1 3 1/2" Amber 20 mh	129.99
USI P1 4 9" Amber 20 mh	109.99
USI 1400C Color Composite	279.99

Novation

103 Smart Cat	169.99
103/212 Auto Cat	399.99
J Cat	99.99
Access 123 (IBM)	469.99
Applicat II	249.99
Applicat Upgrade 1200 Baud	309.00
Cat Modem	135.99
Expansion Module	29.99



- SINCE 1977 -
RETAIL SHOWROOMS
IN CALIFORNIA:

San Jose • (408) 241-2300
San Mateo • (415) 571-1658
San Francisco • (415) 626-2244

COMPUTER DISCOUNT PRODUCTS
860 S. Winchester Blvd., San Jose, California 95128
MAIL, PHONE, WILL-CALL SERVICE FROM 6AM (PST)

- CALL (408) 985-0400 -

- No Charge For Credit Cards
- Prices Subject To Change
- Software Sales Are Final
- International Orders Welcome
- Min. UPS Chg. \$4 + Ins.
- Min. US Postal Chg. \$10
- P.O.'s Welcome - Call First



WACLAW SIERPINSKI AND HIS WONDERFUL CURVE

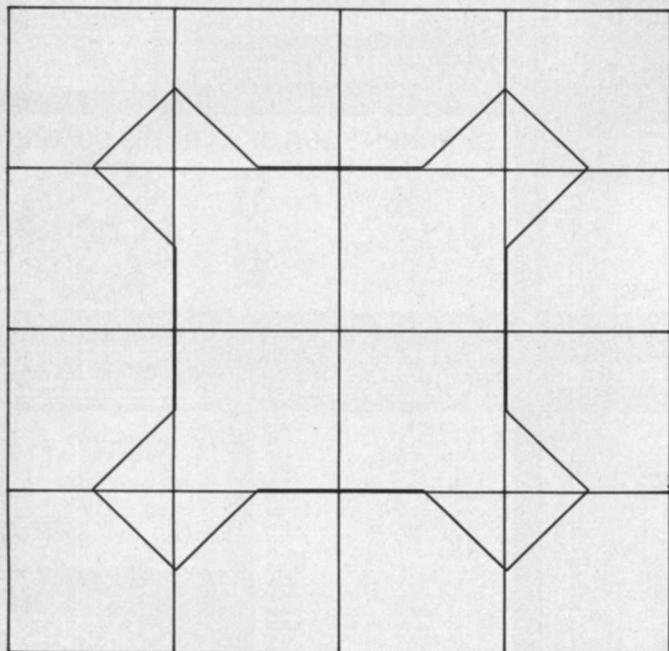


Figure 1. Geometric construction of first order curve.

Sometime in the 1700's, mathematicians described the word "curve" more precisely than had been done previously by defining a curve as the loci of points that satisfy equations that are continuous functions.

If a curve describes a continuous function, it certainly ought to be possible to draw a tangent to any point on the curve. However, by the mid-1800's, mathematicians began to find strange, new curves that had no unique tangent at any point. One of the most famous such curves was one described in 1890 by Giuseppe Peano. This Italian logician showed how a single point, moving continuously over a square, could pass at least once through every point on the surface of the square and its boundary. Peano's curve is a legitimate diagram of a continuous function, yet nowhere on it can a unique tangent be drawn because at no instant can one specify the direction in which the point is moving.

It wasn't long before other logicians proposed curves with similar properties. Two of the most interesting are the curves devised by David Hilbert and Waclaw Sierpinski. Figure 1 shows the method of constructing the basic closed Sierpinski curve. Figure 2 shows the construction of a second order curve.

An interesting problem for computer enthusiasts is to find the area bounded by the Sierpinski curve at its upper limit.

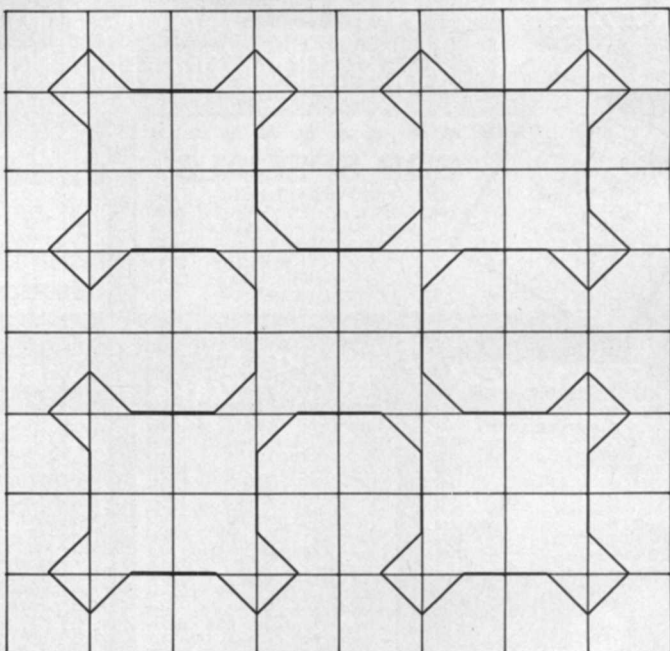


Figure 2. Construction of second order curve.

From Figure 1, we can see that of the 16 smaller squares, a first order Sierpinski curve occupies four squares completely plus 12 one-eighths, or a total of $11/32$ of the total.

Looking at Figure 2, we see that one-quarter of the second order curve occupies the same area as the first order curve plus $7/8$ of the corner square, or $11/32$ plus $7/8 \cdot 1/16$ which equals $51/128$.

If we generalize this progression, we find that the denominator of each new term is four times the previous denominator. Each numerator is four times the previous numerator plus 7. Thus the first few terms of the series are:

$\frac{11}{32}$	$\frac{51}{128}$	$\frac{211}{512}$	$\frac{851}{2048}$	$\frac{3411}{8192}$	$\frac{13651}{32768}$
-----------------	------------------	-------------------	--------------------	---------------------	-----------------------

I leave it up to readers to write a short program to determine the area bounded by the upper limit Sierpinski curve. This area should be expressed as a fraction.

There is much more to be said about Sierpinski and other "monster" curves, but Martin Gardner has said it much more elegantly than I can. See especially "Mathematical Games" in *Scientific American*, Sept. 1976.

LINE AND LINE STEP

The **LINE STEP** command is implemented in later versions of Microsoft GW Basic. Basically, the command **LINE (X,Y)-STEP(a,b)** means to move the distance *a* in the *x* direction and *b* in the *y* direction from the point *X,Y*. In other words, the command **LINE (5,8)-STEP(2,3)** would draw a line from 5,8 to 7,11.

Just the command **LINE -STEP(a,b)** alone would draw a line from the last graphics point plotted (or from 0,0 if nothing had been previously plotted). Readers with GW Basic have their choice of using either the lines in the subroutine at 800 or substituting **LINE-STEP**. However, when we start to do transformations and tilt the curve, the **LINE -STEP** command will no longer work since all *x* and *y* coordinates are expressed as absolute values. Also, the generalized subroutine at 800 can be easily adapted to most plotters whereas the **LINE -STEP** command cannot.

The personal computer has given birth to a shocking new personal problem:



"Where's a person supposed to put all this stuff?"

Computer. Display. Keyboard. Printer. Disk drives. Telephone modem. Software.

Sure, you need it all. But what you don't need is it all over your home or office.

What you need is Actrix.

The whole computer system in one little box.

Actrix really is a whole computer system. A computer, electronic typewriter, display, two disk drives, telephone modem, and printer.

Plus a library of software that includes CP/M, M Basic, C Basic, Perfect Writer, Speller, Filer, and Calc, Money Maestro, Personal Pearl, Communications, and Font Generator.

Enough hardware and software to handle virtually every personal computer application.

And Actrix really is little: It's so compact that it's no bigger than a standard electric typewriter.

Another nice thing about it is the price \$2190*. For everything. Including all the software!

Price out any comparable system and you'll prove to yourself that Actrix is today's

biggest value in personal computers.

You can even have it with high-performance options. Like an 8088 IBM compatible co-processor that supports MS-DOS and CP/M 86. A 1200-baud modem. Double-sided, double-density disk drives.

Actrix. The one personal computer system that doesn't fill up your office with components. That doesn't have wires trailing here, there, and everywhere.

That doesn't need its own special furniture.

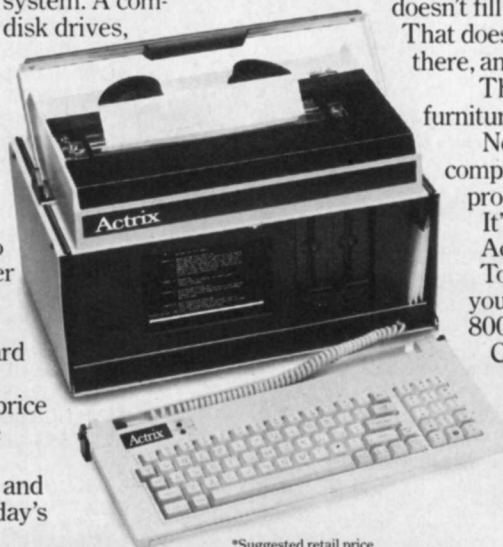
Now, picking up a personal computer that doesn't create personal problems has never been easier.

It's the one you *can* pick up.

Actrix.

To find out where you *can* put your hands on one, call us toll-free:

800-682-8221. Or write: Actrix Computer Corporation, 2159 Bering Drive, San Jose, CA 95131.



*Suggested retail price.

Perfect Writer, Speller, Filer, and Calc are trademarks of Perfect Software, Inc. CP/M and C Basic, of Digital Research, Inc. M Basic, of Microsoft, Inc. Money Maestro, of InnoSys Inc. Personal Pearl, of PEARLSOFT.

Actrix

A whole computer system
in one little box.SM

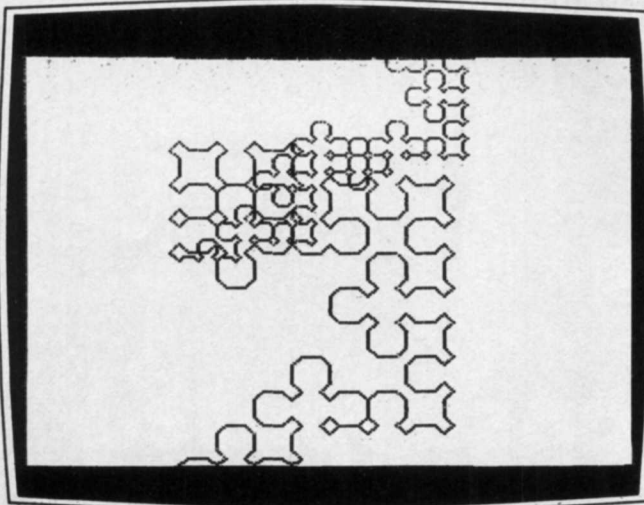


Figure 1. Incorrect curve drawn with Listing 2.

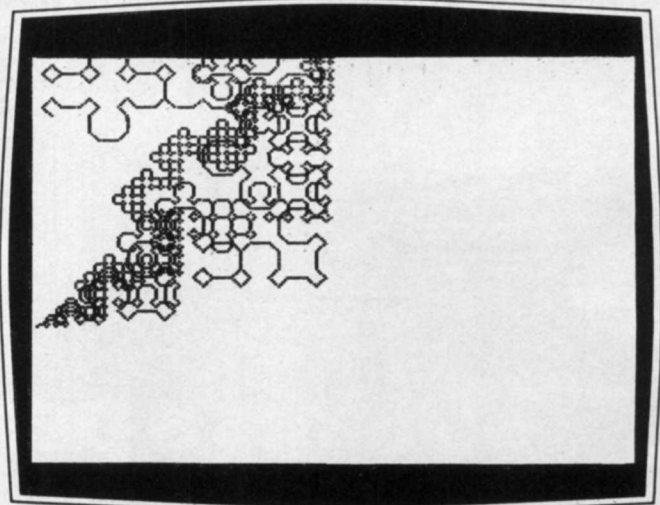


Figure 2. Removal of dummy plot variables.

This is a situation frequently faced by programmers. You would like to take advantage of the work done by someone else and not, so to speak, reinvent the wheel. However, the routine you want is in another language or a different dialect of the language in which you are working. What to do?

Since I had a good idea of the shape of the Sierpinski curve, I could deduce what the program should be doing. Basically, the end point of each new line should be fairly close to the previous point and should differ by a one or two units in the x or y direction, or both. Consequently, it appeared that the two variables in the STEP portion of the LINE statement were x and y increments. Since MSX Basic does not have an incremental plot function, I substituted a subroutine (lines 800-820) and two variables, A and B, for the LINE STEP statement. Cumbersome, but I thought it would work (see Listing 2).

Unfortunately, the program in Listing 2 did nothing of the kind, and produced the curve in Figure 1. Obviously something was wrong. But what?

My first thought was that the plotting subroutine perhaps did not need the dummy variables C and D to represent X and Y, so I eliminated them from the subroutine. I was rewarded with the curve in Figure 2—hardly an improvement.

```
800 ' Plotting Subroutine
810 LINE(X,Y)-(X+A,Y+B)
820 X=X+A:Y=Y+B:RETURN
```

Well, of course! The initial value of HO (see line 100) should be set to the vertical height of the screen, or 192. At least that's what I thought before I saw the output in Figure 3. Actually, it

Listing 2. First conversion of program to MSX Basic.

```
10 SCREEN 1
15 C=64:D=192
20 FOR DI=3 TO 5
30 GOSUB 100
40 NEXT DI
50 GOTO 50
100 HO=128:SP=0:H=HO/4:X=2*H:Y=3*H:I=0
110 I=I+1:X=X-H:H=H/2:Y=Y+H
120 IF I<DI THEN 110
130 PS=I:GOSUB 600
140 GOSUB 200:A=H:B=-H:GOSUB 800
150 GOSUB 300:A=-H:B=-H:GOSUB 800
160 GOSUB 400:A=-H:B=H:GOSUB 800
170 GOSUB 500:A=H:B=H:GOSUB 800
180 GOSUB 700
190 RETURN
200 ' Subroutine A
210 IF TP<=0 THEN RETURN
220 PS=TP-1:GOSUB 600
230 GOSUB 200:A=H:B=-H:GOSUB 800
240 GOSUB 300:A=2*H:B=0:GOSUB 800
250 GOSUB 500:A=H:B=H:GOSUB 800
260 GOSUB 200
270 GOSUB 700
280 RETURN
300 ' Subroutine B
310 IF TP<=0 THEN RETURN
320 PS=TP-1:GOSUB 600
330 GOSUB 300:A=-H:B=-H:GOSUB 800
```

```
340 GOSUB 400:A=0:B=-2*H:GOSUB 800
350 GOSUB 200:A=H:B=-H:GOSUB 800
360 GOSUB 300
370 GOSUB 700
380 RETURN
400 ' Subroutine C
410 IF TP<=0 THEN RETURN
420 PS=TP-1:GOSUB 600
430 GOSUB 400:A=-H:B=H:GOSUB 800
440 GOSUB 500:A=-2*H:B=0:GOSUB 800
450 GOSUB 300:A=-H:B=-H:GOSUB 800
460 GOSUB 400
470 GOSUB 700
480 RETURN
500 ' Subroutine D
510 IF TP<=0 THEN RETURN
520 PS=TP-1:GOSUB 600
530 GOSUB 500:A=H:B=H:GOSUB 800
540 GOSUB 200:A=0:B=2*H:GOSUB 800
550 GOSUB 400:A=-H:B=H:GOSUB 800
560 GOSUB 700
570 RETURN
600 ' Push subroutine
610 SP=SP+1:ST(SP)=PS
620 TP=PS:RETURN
700 ' Pop subroutine
710 SP=SP-1:TP=ST(SP):RETURN
800 ' Plotting Subroutine
810 LINE(C,D)-(C+A,D+B)
820 C=C+A:D=D+B:RETURN
```

Looks like a Ferrari. Drives like a Rolls. Parks like a Beetle.



Ask your computer dealer
to take the cover off a world-class disk drive.

The all new, 1984 Indus GT.™

The most advanced, most handsome disk
drive in the world.

A flick of its power switch can turn an Atari
into a Ferrari.

Or an Apple into a Red Hot Apple.

Looks like a Ferrari.

The Indus GT is only 2.65" high. But under its
front-loading front end is slimline engineering
with a distinctive European-Gran flair.

Touch its LED-lit CommandPost™ function
control AccuTouch™ buttons. Marvel at how
responsive it makes every Atari or Apple home
computer.

Drives like a Rolls.

Nestled into its soundproofed chassis is the
quietest and most powerful disk drive power sys-
tem money can buy. At top speed, it's virtually
unhearable. Whisper quiet.

Flat out, the GT will drive your Atari track-to-
track 0-39 in less than one second. Increasing
data transfer 400%. (Faster than any other drive.
And as fast as any Apple disk drive.)

And each GT comes with the exclusive
GT DrivingSystem™ of software programs.*
World-class word processing is a breeze with
the GT Estate WordProcessor.™ And your dealer
will describe the two additional programs that
allow GT owners to accelerate their computer
driving skills. *Included as standard equipment.

Also, the 1984 Indus GT is covered with the
GT PortaCase.™ A stylish case that conveniently
doubles as a 80-disk storage file.

Parks like a Beetle.

The GT's small, sleek, condensed size makes it
easy to park.

And its low price makes it easy to buy.

\$449 for Atari. \$329 for Apple.

So see and test drive the incredible new 1984
Indus GT at your nearest
computer dealer soon.

The drive will be
well worth it.



INDUS™

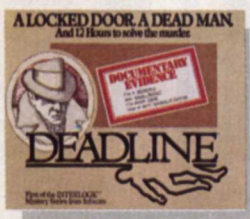
The all-new 1984 Indus GT Disk Drive.

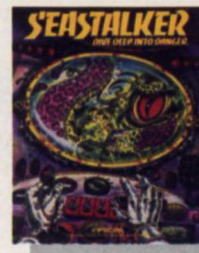
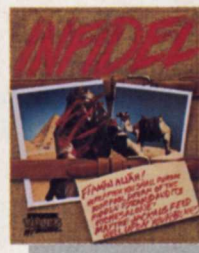
The most advanced, most handsome disk drive in the world.

For dealer information, call 1-800-33-INDUS. In California, 1-800-54-INDUS, 213/882-9600.

© 1983 Indus Systems, 9304 Deering Avenue, Chatsworth, CA 91311. The Indus GT is a product of Indus Systems. Atari is a registered trademark of Atari, Inc. Apple is a registered trademark of Apple Computer, Inc.

CIRCLE 135 ON READER SERVICE CARD





THE INCOMPLETE WORKS OF INFOCOM, INC.

Incomplete, yes. But it's not just because we're always bringing out new stories in the Infocom interactive fiction collection. Nor is it simply due to the fact that with all the writing and re-writing, honing and perfecting that we put into every one of our stories, our work is seemingly never done.

The real reason is: an Infocom work of fiction can never be complete until you become a part of it.

You see, as hard as we work at perfecting our stories, we always leave out one essential element—the main character. And that's where you enter in.

Once you've got Infocom's interactive fiction in your computer, you experience something akin to waking up inside a novel. You find yourself at the center of an exciting plot that continually challenges you with surprising twists, unique characters (many of whom possess extraordinarily developed personalities), and original, logical, often hilarious puzzles. Communication is carried on in the same way as it is in a novel—in prose. And interaction is easy—you type in full English sentences.

But there is this key difference between our tales and conventional novels: Infocom's interactive fiction is active, not passive. The course of events is shaped by the actions you choose to take. And you enjoy enormous freedom in your choice of actions—you have hundreds, even thousands of alternatives at every step. In fact, an Infocom interactive story is roughly the length of a short novel in content, but because you're actively engaged in the plot, your adventure can last for weeks and months.

In other words, only you can complete the works of Infocom, Inc. Because they're stories that grow out of your imagination.

Find out what it's like to get inside a story. Get one from Infocom. Because with Infocom's interactive fiction, there's room for you on every disk.

INFOCOM™

Infocom, Inc., 55 Wheeler Street, Cambridge, MA 02138

For you: Apple II, Atari, Commodore 64, CP/M8*, DECmate, DEC Rainbow, DEC RT-11, IBM PC* and PCjr, KAYPRO II, MS-DOS 2.0*, NEC APC, NEC PC-8000, Osborne, Tandy 2000, TI Professional, TI 99/4A, TRS-80 Models I and III.

*Use the IBM PC version for your Compaq, and the MS-DOS 2.0 version for your Wang or Mindset.

CIRCLE 136 ON READER SERVICE CARD



DON'T PAY CASH USE YOUR COMPUTERCARD™

The Computer-Line believes that it is important to be competitive by offering low prices; however, we regard service as the **most** important asset of a mail-order organization. All our lines are available so that you, the customer, are able to talk to fully qualified computer specialists trained to answer **all** your questions pertaining to our line of microcomputers. We are renowned for our excellent after-sales support and our promptness for delivery. Peace of mind and excellence in service is our pledge to all our customers.

NEW FRANKLIN SYSTEMS

Compatible with the Apple computer!

1000 Pro Pack Plus:

Featuring:

- 1000 CPU
- Franklin Monitor
- 80 Column Card
- Ace 10 Disk Drive + Controller
- Ace Calc.
- Ace Writer
- Data Perfect
- Welcome Package

**TOO LOW
TO PUBLISH**

1200 OMS Package:

Featuring:

- 1200 CPU
- 80 Column Card
- 2 Disk Drives + Controller
- CP/M Card + Software
- Parallel & Serial Interfaces
- Wordstar
- Mailmerge
- Ace Calc.
- Welcome Package

**TOO LOW
TO PUBLISH**

IBM PERSONAL COMPUTERS

Take A Demonstration on the IBM
PC. Our System Includes:

- Two Double-Sided Drives
- 256K of Memory
- Color Graphics Adaptor

ONLY \$2899.00

Maximum of 4 weeks delivery on all IBM systems.

COLUMBIA DATA PRODUCTS

- IBM PC Compatible • 128K Main Memory • 8 Expansion Slots • 2 Serial and One Parallel Port Built In • 2 Double Sided/Double Density 320K Drives • Over \$3000 Free Software Including:

- Perfect Writer/Speller
- Perfect Filer/Calc.
- Home Accountant
- Fast Graphs
- MS DOS/CP/M and more!

**Too Low
To
Publish**

VP

PORTABLE UNIT
—Same as 1600-1 except this unit is truly portable

MPC-1600-4

HARD DISK UNIT
—Compatible to IBM PCXT
—Includes 12 megabyte hard disk

FOR IBM

QUADRAM	
Quadcolor 1 color & graphics board	\$249.95
Quadboard 1 w/64K Ser. Par. Clock	\$279.95
Quadlink Apple Emulation System	\$479.95
Microfaster P/P, P/S, S/P, S/S	SCALL
TECMAR	
Captain	SCALL
1st Mate	SCALL
2nd Mate	SCALL
Graphics Master	SCALL
AMDEK	
MAI-Monochrome & RGB	\$499.95
KEYTRONICS KEYBOARD	\$229.95
MICROSOFT SYSTEMS BOARD	SCALL
AST	
6-PAK plus w/64K (384K max), Ser. Par. Clock	\$289.95
Mega plus w/64K (512K), 2 Ser. Par. Clock	\$389.95
Combo plus w/64K Ser. Par. Clock	\$289.95
I/O plus 2 Ser. 1 Par. Clock	\$249.95
MAYNARD	
Disk Drive Controller Card	SCALL
Controller w/Parallel Port	SCALL
Controller w/Ser/Par Port	SCALL
BABY BLUE CP/M card w/z-80	SCALL

HAVOC

Great First Computer

- Apple Compatible
- Detached Keyboard
- Built-In Disk Drive
- Built-In Parallel Port
- Built-In Serial Port

**SUPER
LOW
PRICE
\$769.95**

CORONA

- 128K Expandable to 512K
- 2 DS/DD 320K Disk Drives
- 4 Expansion Slots
- 1 Parallel Port
- 1 Serial Port
- Hi-Res Monitor

	Green	Amber
Desk Top	\$2695.00	\$2725.00
Portable	\$2579.95	\$2595.00

EPSON QX-10

State of the Art Simplicity—Complete Software Package w/ALDOCS & CP+ CP-M

SCALL

TAVA PC

- IBM Compatible
- 2 DS/DD 320K Disk Drives
- Serial Port
- Parallel Port
- Hi-Res Monitor

\$1995.00

PANASONIC
Portable with Built-in Printer
CALL FOR LOW PRICE

DISK DRIVES

FOR IBM

PANASONIC/NATIONAL 320K 1/2 height	\$199.95
TANDON TM 100-2 DS/DD 320K	\$219.95
TM 55-2 1/2 height	\$219.95
CDC CDC 320K DS/DD	\$239.95

WINCHESTERS

10 MEG internal or External
for IBM **\$1195.00**

MAYNARD WS-2

Hard Disk For IBM

10 MEG internal

1/2 height

Controller & Power Supply

BONUS—\$70 trade-in on your IBM controller card

ONLY \$1299.95 COMPLETE

DAVONS CORVUS

QUENTIN TALLGRASS Hard Disk Drives

Special of the Month

QUENTIN

DISK DRIVES FOR YOUR APPLE/FRANKLIN COMPUTER \$199.95
limited quantities

SOFTWARE

BUSINESS	APPLE	IBM
Lotus 1-2-3	\$289.95	\$319.95
DB Master (version 4)	\$449.95	\$469.95
DBASE II	\$189.95	\$199.95
Multiplan	\$159.95	\$169.95
The General Manager	SCALL	SCALL
TK Solver	\$279.95	\$419.95
BPI-Gen Act/Inv/Payroll	\$419.95	—
Job Costing	—	\$339.95
Word w/Mouse	\$439.95	\$439.95
Wordstar Professional	—	—
Screenwriter II	\$89.95	—
Sensible Speller	\$89.95	—
PFS: Write/Fix/Report	\$89.95	\$99.95
Peachtree 5000	—	\$269.95
Supercalc 3	—	\$279.95
Visicalc IV	SCALL	SCALL
HOME/GAMES/EDUCATION		
Home Accountant	\$49.95	\$109.95
Dollars and Sense	\$74.95	\$129.95
Micro Cookbook	\$139.95	\$139.95
Bank Street Writer	\$34.95	\$34.95
Tax Advantage	\$49.95	\$49.95
Zaxxon	\$29.95	—
Lode Runner/Chopster	\$29.95	—
Zork I, II, III	\$27.95	\$27.95
Deadline/Winnes/Planet	\$35.95	\$35.95
Flight Simulator	\$34.95	\$34.95
Sargon III	\$34.95	—
Frogger	\$26.95	\$26.95
Temple of Apshu	\$26.95	\$26.95
Master Type	\$26.95	\$26.95
Kinder Comp/Alphabet Zoo	\$23.95	\$23.95
Story Machine/Facemaker	\$24.95	\$24.95
Snooper Troops Case #1/#2	\$34.95	\$34.95

PRINTERS

Special of the Month

F-10 Letter Quality 40CPS	\$999.95
—Parallel or Serial	
Epson	
Brother	
Dynax DX-15	\$489.95
Dynax DX-25	\$779.95
Juki	
8100 Letter Quality	\$479.95
NEC Spinner	SCALL
Datapro Transfer-QUME	SCALL
Data Products Olivetti	SCALL
Olivetti S24	\$319.95
Olivetti S24	SCALL
Olivetti S24P 160CPS	\$449.95
Olivetti S24P 160CPS	\$739.95
Olivetti Facemart 2410	\$2499.95
Olivetti I	\$39.95
Olivetti Plug & Play	\$43.95
Star Micronics	
Gemini 10X 120CPS	SLOW
Gemini 15X 120CPS	SLOW
Toshiba 1350 Dot Matrix	SLOW
Integral Data Systems	
Color Print 132 4 Color	\$499.95
C-10th	\$1499.95
Proprinter II 8510 PAR	\$359.95
Proprinter II 1550 PAR	\$589.95
Hot Dot 160CPS	SCALL

FOR APPLE COMPUTERS

MICROSOFT	
Software 2-80	\$249.95
Ram Card 16K	\$77.95
ORANGE MICRO	
Grappier+ printer-inter	\$109.95
Grappier+ printer-inter	\$159.95
VIDEX	
Video Term-800/601	SCALL
Function Strip	\$64.95
Display Enhancer II	\$99.95
MICROTEK	
Apple Dumping	SCALL
Dumping W/16K	SCALL
PRACTICAL PERIPHERALS	
Micro Buffer II (16K plus)	\$199.95
GRAPHICS INTERFACE	
For Apple/Franklin	
Just Like	only \$89.95
Grappier	
KOALA TABLET	\$69.95
HAYES	\$69.95
March III Joystick	\$39.95
Micro Print	\$44.95
Joystick	\$29.95
Paddles	\$44.95
Select-a-Port	\$44.95
KENNINGTON	
System Saver	\$69.95

MONITORS

AMDEK	
Video 300 Med-Res Green	\$139.95
Video 300A Med-Res Amber	\$149.95
Video 310A Hi-Res Amber	\$179.95
Color I+ Composite	\$299.95
Color II+ RGB	\$399.95
Color IIIA Hi-Res Composite	\$419.95
Color IV+ Hi-Res Composite	SCALL
USI	
Pi-2 Med-Res Green	\$135.95
Pi-3 Med-Res Amber	\$149.95
NEC	
ZENITH ZVM-123	SCALL
PRINCETON GRAPHICS	
HX-12 Hi-Res RGB	\$469.95
for IBM PC	while they last
LEADING EDGE	
Gorilla Hi-Res Green	\$89.95
Gorilla Hi-Res Amber	\$95.95
TAXAN	
KG-12N Hi-Res Green	\$139.95
KG-12N-UY Hi-Res Amber	\$149.95
KX-121 Hi-Res Green for IBM	\$169.95
KX-122 Hi-Res Amber for IBM	\$179.95
420 Hi-Res RGB	\$559.95
Tilt Swivel Base w/Clock	\$49.95

MODEMS

NETWORKER™	
Plug in single slot direct connect modem	for everything
for Apple II family & Franklin computers with communications software	includes subscription to the SOURCE
\$119.95	
NETMASTER™	
software package \$39.95 w/purchase of NETWORKER™	
D.C. HAYES	
Smartmodem 300 BAUD	\$219.95
Smartmodem 1200 BAUD	\$479.95
Smartmodem 1200B W/SCII	\$419.95
Smartmodem IIe W/SCII	\$249.95
Chronograph	\$189.95
U.S. ROBOTICS	
300 BAUD	\$169.95
Auto Dial 1200	\$449.95
Password 1220 BAUD	\$339.95
NOVATION	
iCat	\$119.00
Apple-Cat II	SCALL
COMPUTER FURNITURE	
RUSH	
Desk Oak Veneer	\$109.95
Auto Oak Veneer	\$64.95
Printer Stand Oak Veneer	\$59.95

DISKS/SUPPLIES

Verbatim 5.25/5 1/4 floppy	\$23.95
Verbatim DS/DD 5 1/4 floppy	\$31.95
Dynab 5.25/5 1/4 floppy	\$27.95
Dynab DS/DD 5 1/4 floppy	\$36.95
ESK 5.25/5 1/4 floppy	\$19.95
ESK DS/DD 5 1/4 floppy	\$27.95
Elephant 5.25/5 1/4 floppy	SCALL
Elephant DS/DD 5 1/4 floppy	SCALL
Control Data 5.25/5 1/4 floppy	\$22.95
Control Data DS/DD 5 1/4 floppy	SCALL
Library cases holds 10 disks	\$1.95
Disk Storage Box holds 70 disks	\$19.95
Flip-n-file 25 holds 25 disks	SCALL
Flip-n-file 50 holds 50 disks	\$19.95
Flip-n-file 70 holds 70 disks	\$23.95

64K RAM MEMORY

UPGRADE FOR IBM PC

\$53.95

SURGE SUPPRESSORS

EDP	
Lemon	\$49.50
Lime	\$7.00
Peach	\$7.00
Orange	\$105.00

**NEW
48 HOUR SERVICE**



THE COMPUTER-LINE™

Committed to bringing computers within the reach of all Americans

**CALL (800) 255-4659 (Outside California)
CALL (800) 541-4300 (Inside California)**

When in California, please visit us at:

**21054 SHERMAN WAY
CANOGA PARK, CA 91303
CALL: (818) 716-1812**

**17791 FITCH ST.
IRVINE, CA 92714
CALL: (714) 863-9944**

**General/Mailorder (714) 863-9988
CUSTOMER SERVICE AND ORDER INQUIRY (714) 863-9933**

When in Colorado, please visit us at:

**1136 COLORADO BLVD.
DENVER, CO 80222
CALL: (303) 758-3261**

TERMS. All prices reflect a 2.9% cash discount. All goods acknowledged faulty on receipt by the customer will be repaired or replaced at our discretion. Customers must call for an RMA number before returning any goods. This facilitates our quick attendance to faulty goods. We reserve the right to repair or return to the manufacturer for repair all goods becoming faulty within the specified warranty period. Any goods (hardware or software) returned for restocking are subject to a 15% restocking fee at our discretion. The charge for cancellation of orders is 20% at our discretion. No returns on software. We accept no responsibility for any false claims made by manufacturers. Prices quoted for stock on hand and subject to change without notice. Specialists in APO and international deliveries. Please add 3% (minimum \$3.00) for shipping. APO add to all prices 5% for shipping (minimum \$5.00). We will calculate exact freight. Please allow a minimum of 2 weeks plus mail time (if an order is mailed in) for receipt of all UPS delivered goods. All goods (other than APO or international) delivered UPS ground. All items listed available for 48 hour service provided products are readily available from the manufacturer.

ALL BRANDS ARE REGISTERED TRADEMARKS

CIRCLE 117 ON READER SERVICE CARD

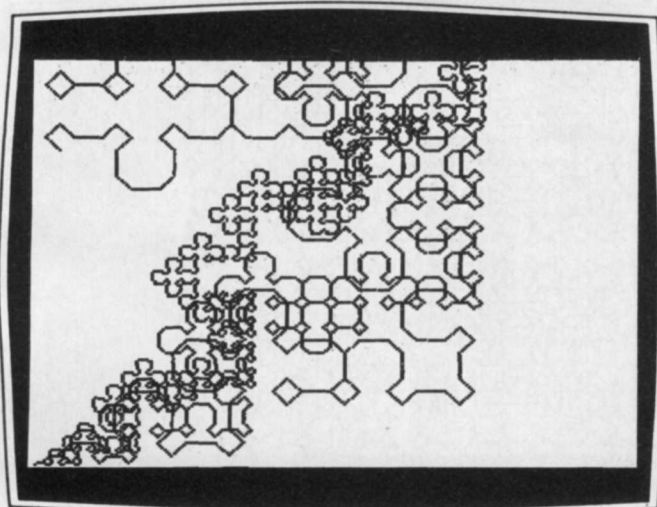


Figure 3. Curve with increased vertical height.

was slightly better than the previous one, but it occurred to me that I really should start at the beginning—with just one, large curve.

```
100 H0=192:SP=0:H=H0/4:X=2*H:Y=3*H:I=0
```

Hence, I changed the main loop to go from 1 to 1 and wound up with the curve in Figure 4. Ah, that's better; at least the program can draw one complete curve successfully.

```
20 FOR DI=1 TO 1
30 GOSUB 100
40 NEXT DI
```

Next I enlarged the loop to draw the second curve and got the curve shown in Figure 5.

```
20 FOR DI=1 TO 2
30 GOSUB 100
40 NEXT DI
```

Where were the last three segments of the second order curve? I had no idea, so I pored over the original program once again and compared it to my translated version. Lo and behold, I found a line missing in subroutine D, in particular, the one in

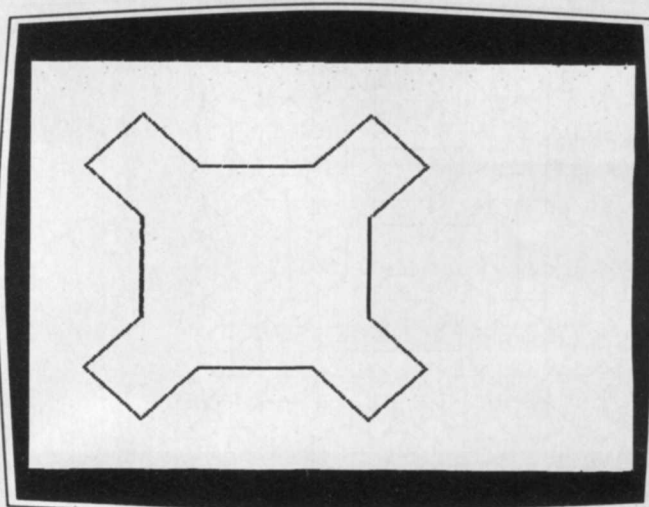


Figure 4. First order curve.

which it calls itself. I inserted this as line 560, ran the program again, and was rewarded with two complete curves (Figure 6).

```
500 ' Subroutine D
510 IF TP<=0 THEN RETURN
520 PS=TP-1:GOSUB 600
530 GOSUB 500:A=H:B=H:GOSUB 800
540 GOSUB 200:A=0:B=2*H:GOSUB 800
550 GOSUB 400:A=-H:B=H:GOSUB 800
560 GOSUB 500
570 GOSUB 700
580 RETURN
```

You might wonder why I didn't just start here and publish this debugged program in *Creative Computing*. After all, you certainly don't care about the incorrect version. My reason for publishing the prior steps is to illustrate the process of conversion from one dialect of Basic to another and to show that, all too often, problems that we blame on the program are something else entirely. You would be amazed at the number of letters and phone calls I get about a program in *Basic Computer Games* or *Creative Computing* that "doesn't work" because the person copying it has left out a line or copied incorrectly.

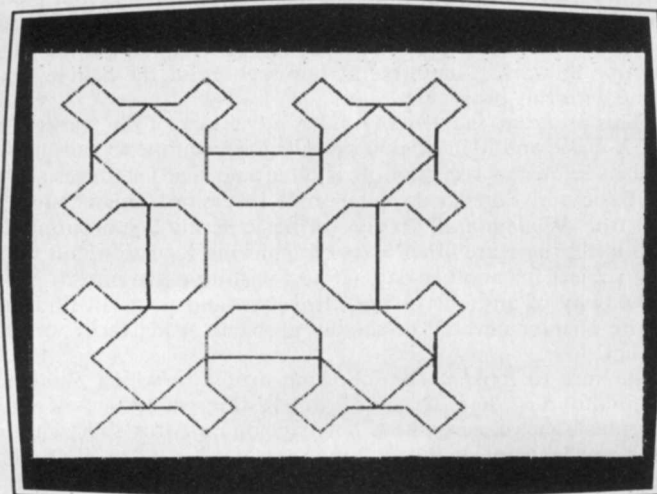


Figure 5. Second order curve missing three segments.

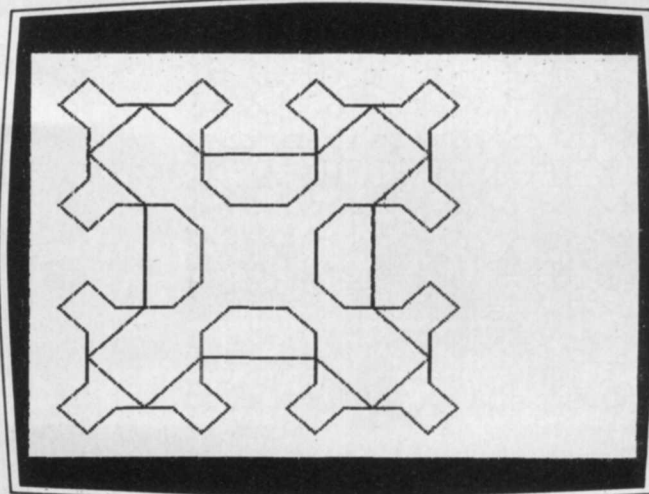


Figure 6. First and second order curves.

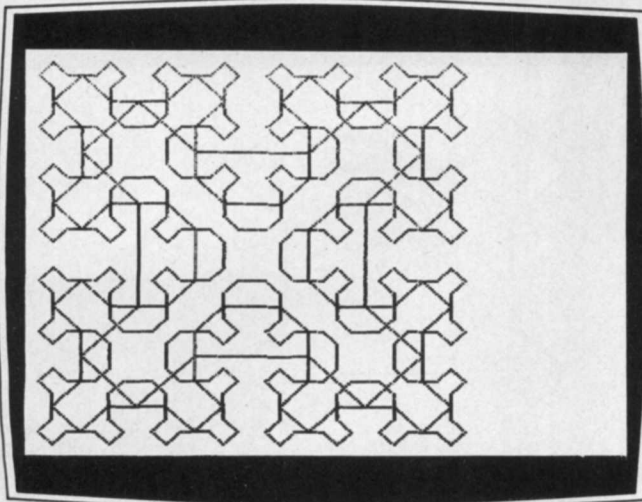


Figure 7. First to third order curves.

Back to Mr. Sierpinski. Things now appeared to be in order, so I expanded the number of curves to three and got a correct plot (see Figure 7).

```
20 FOR DI=1 TO 3
30 GOSUB 100
40 NEXT DI
```

What happens when the upper and lower bounds of the main loop are changed? I tried the program with limits of 2 and 4 and got the delightful output shown in Figure 8.

```
20 FOR DI=2 TO 4
30 GOSUB 100
40 NEXT DI
```

Could a fifth level curve be plotted? Yes, but the resolution of my SpectraVideo 328 and Sakata monitor started to go over the brink (see Figure 9), so I settled for a fourth level curve.

Next, I introduced some color with two additional statements (25 and 35). This colors the background after the first curve is drawn and then uses different colors for the next two curves. The effect is quite striking!

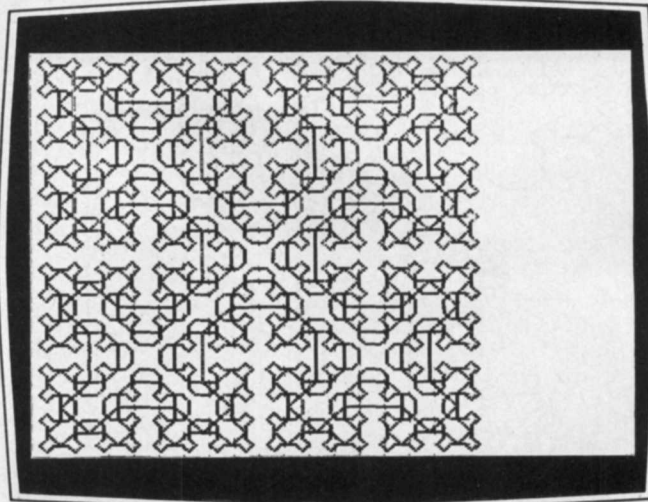


Figure 8. Second to fourth order curves.

```
20 FOR DI=2 TO 4
25 CO=4*(DI-1)
30 GOSUB 100
35 IF DI=2 THEN PAINT (191,191),CO
40 NEXT DI
```

Okay, everything now worked and it was time to tidy up the program with a few remarks, labels, and blank lines. The final program is shown in Listing 3. It is a great deal of fun to watch these curves being traced out on the screen; try it!

Putting the screen plot routine into a subroutine instead of 16 separate LINE statements as in the original had an unexpected benefit, namely that it can be easily changed for different computers or for a plotter. For example, suppose you have a Houston Instruments DMP-29 plotter. To plot the Sierpinski curve on your plotter requires just the following five new lines.

```
30 PRINT #1,"Z :: A"
70 PRINT #1,"U"
90 PRINT #1,"P0":END
125 PRINT #1,X,Y "D"
810 PRINT #1,X+A,Y+B
```

Line 30 initializes the plotter; line 125 moves the pen to the starting point and puts it down; line 810 does the actual plot; line 70 raises the pen; and line 90 moves the pen home. If you have a different plotter, you should have no trouble getting this routine to work. The curve at the opening of the article was done with this program.

This program, incidentally, takes advantage of the feature in MSX Basic and MBasic that permits a subroutine to call itself. This is known as recursion. It is often said that languages such as Basic and Fortran do not permit recursion. This is simply not true. While not all versions of Basic permit a subroutine to call itself, there are other ways of achieving recursion, but that is a subject for another day. (If you wish to delve into it, pick up a copy of any one of my *Ideabooks*, and you will find an entire chapter devoted to solving problems using recursion in Basic).

Be sure to look at the following article in which William Fujimoto has devised several interesting variations of the Sierpinski curve using the C language on an Altos 8600 with a Houston Instruments DMP-2 plotter. (No, I don't pretend you can easily translate from C to Basic, but using this Basic program you ought to be able to implement some of the variations suggested by Mr. Fujimoto).

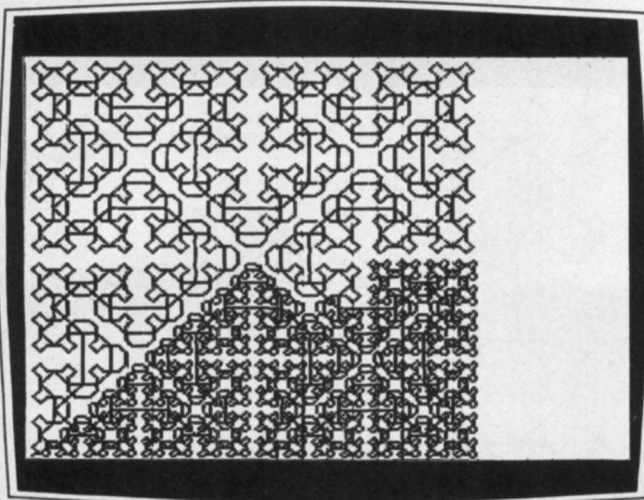


Figure 9. Fifth order curve (partially drawn) exceeds screen resolution.

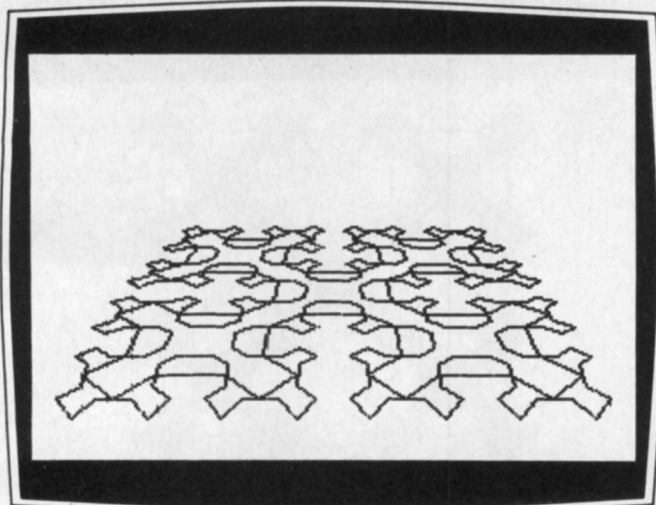


Figure 10. Tilted second and third order curves.

For example, a tilted curve can be implemented in the Basic program just by adding and changing a few lines. Dummy plot variables (XP, YP, XQ, and YQ) are set up in lines 115 and 116 and then updated in the plot subroutine. This produces the "tilted" plots in Figures 10 and 11..

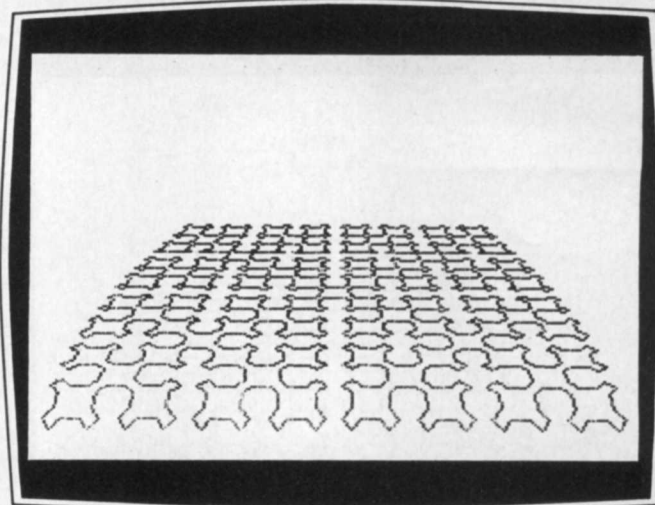


Figure 11. Tilted fourth order curve.

```

115 YP=SQR(Y)*7
116 XP=X*(-Y/(2*H0)+1)+Y/4
800 ' Plotting Subroutine
805 X=X+A:Y=Y+B
810 YQ=SQR(Y)*7
812 XQ=X*(-Y/(2*H0)+1)+Y/4
815 LINE (XP,YP)-(XQ,YQ)
820 XP=XQ:YP=YQ:RETURN

```

Listing 3. Final Sierpinski Curve program.

```

10 CLS:COLOR 15,1:LOCATE 11,5
20 PRINT "Sierpinski Curve"
30 LOCATE 13,9:PRINT "by David Ahl"
33 '
34 ' Main Loop
35 FOR N=1 TO 900:NEXT N
40 SCREEN 1:FOR DI=2 TO 4
50 CO=4*(DI-1)
60 GOSUB 100
70 IF DI=2 THEN PAINT (191,191),CO
80 NEXT DI
90 GOTO 90
98 '
99 ' Initialization and main curve
100 H0=192:SP=0:H=H0/4:X=2*H:Y=3*H:I=0
110 I=I+1:X=X-H:H=H/2:Y=Y+H
120 IF I<DI THEN 110
130 PS=I:GOSUB 600
140 GOSUB 200:A=H:B=-H:GOSUB 800
150 GOSUB 300:A=-H:B=-H:GOSUB 800
160 GOSUB 400:A=-H:B=H:GOSUB 800
170 GOSUB 500:A=H:B=H:GOSUB 800
180 GOSUB 700
190 RETURN
199 '
200 ' Subroutine A
210 IF TP<=0 THEN RETURN
220 PS=TP-1:GOSUB 600
230 GOSUB 200:A=H:B=-H:GOSUB 800
240 GOSUB 300:A=2*H:B=0:GOSUB 800
250 GOSUB 500:A=H:B=H:GOSUB 800
260 GOSUB 200
270 GOSUB 700
280 RETURN
299 '
300 ' Subroutine B
310 IF TP<=0 THEN RETURN
320 PS=TP-1:GOSUB 600
330 GOSUB 300:A=-H:B=-H:GOSUB 800
340 GOSUB 400:A=0:B=-2*H:GOSUB 800
350 GOSUB 200:A=H:B=-H:GOSUB 800
360 GOSUB 300
370 GOSUB 700
380 RETURN
399 '
400 ' Subroutine C
410 IF TP<=0 THEN RETURN
420 PS=TP-1:GOSUB 600
430 GOSUB 400:A=-H:B=H:GOSUB 800
440 GOSUB 500:A=-2*H:B=0:GOSUB 800
450 GOSUB 300:A=-H:B=-H:GOSUB 800
460 GOSUB 400
470 GOSUB 700
480 RETURN
499 '
500 ' Subroutine D
510 IF TP<=0 THEN RETURN
520 PS=TP-1:GOSUB 600
530 GOSUB 500:A=H:B=H:GOSUB 800
540 GOSUB 200:A=0:B=2*H:GOSUB 800
550 GOSUB 400:A=-H:B=H:GOSUB 800
560 GOSUB 500
570 GOSUB 700
580 RETURN
599 '
600 ' Push subroutine
610 SP=SP+1:ST(SP)=PS
620 TP=PS:RETURN
699 '
700 ' Pop subroutine
710 SP=SP-1:TP=ST(SP):RETURN
799 '
800 ' Plotting Subroutine
810 LINE(X,Y)-(X+A,Y+B),CO
820 X=X+A:Y=Y+B:RETURN

```

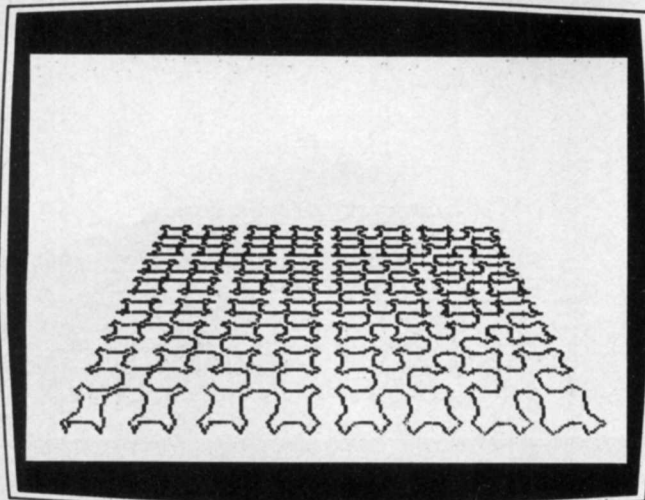


Figure 12. Tilted fourth order curve with straight sides.

If you would rather have straight sides as in Figure 12, it is simply a matter of changing two lines.

```
116 XP=X*(-YP/H0+1)+YP/2
812 XQ=X*(-YP/H0+1)+YP/2
```

But enough. I could go on forever with more variations. But unlike the Sierpinski curve which has no end, this article does. Here it is.

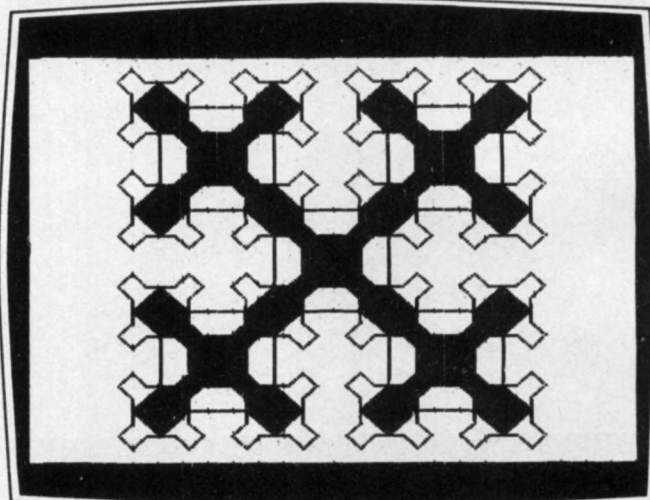


Figure 13. The PAINT command was used to fill in the center area of a second and third order curve.

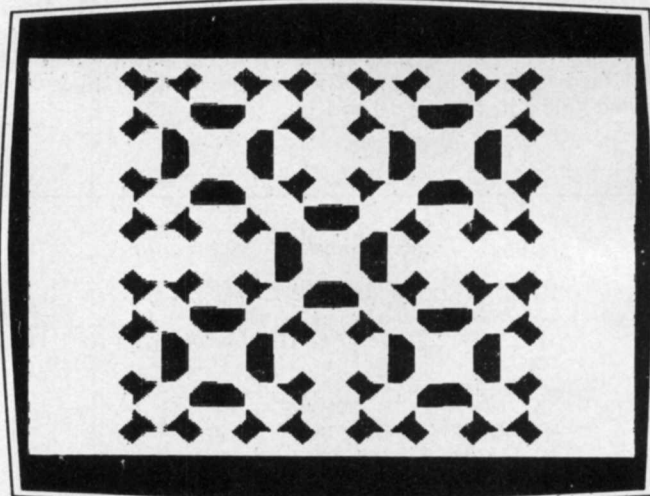


Figure 14. Reversed image of Figure 13 with the outside also filled in.

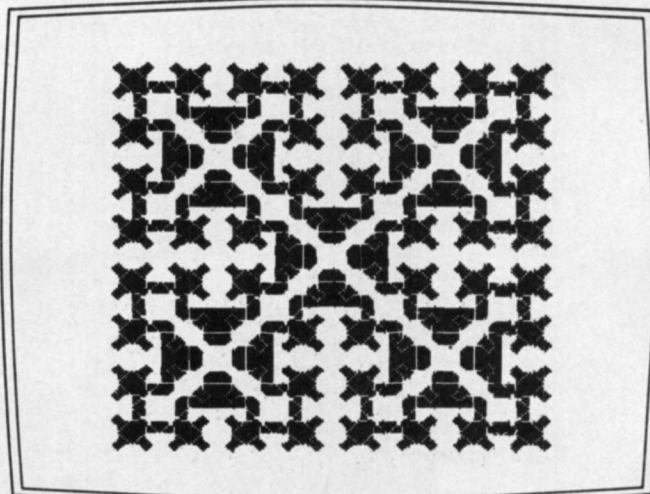
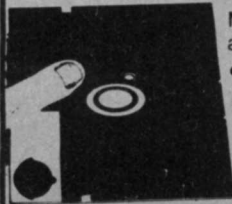


Figure 15. Second to fourth order curve painted from the center and outside.

*REDUCES DISKETTE COST 50%!



Make use of the back of your 5 1/4" Diskettes and SAVE

- **NIBBLE NOTCH** tools make it easy.
- Adds the precise notch where you need it.
- Doubles diskette space or MONEY BACK!

NIBBLE NOTCH I

Cuts square notch for Apple, II, II+, IIe, III, Franklin and Commodore.

only **\$14.95** each

add \$1.50 each P&H (\$4.50 each foreign P&H)

DISK OPTIMIZER® SYSTEM

SOFTWARE FOR APPLE, II, II+, IIe, III & Franklin

- **469% FASTER** Than Similar Programs!
- Certifies your "new" disk 100% Error Free
- Removes Bad Sectors • Adds 36th Track
- Performs Disk Drive Speed Check
- Adds DOS and More

only **\$24.95** each

add \$1.50 each P&H (\$4.50 each foreign P&H)

— OR BUY BOTH —

only **\$29.95**

add \$2.50 each set P&H (\$6.50 foreign P&H)

Florida Residents Add 5% Sales Tax

SATISFACTION GUARANTEED OR YOUR MONEY BACK!

ORDER TODAY!

SEND CHECK OR MONEY ORDER TO:

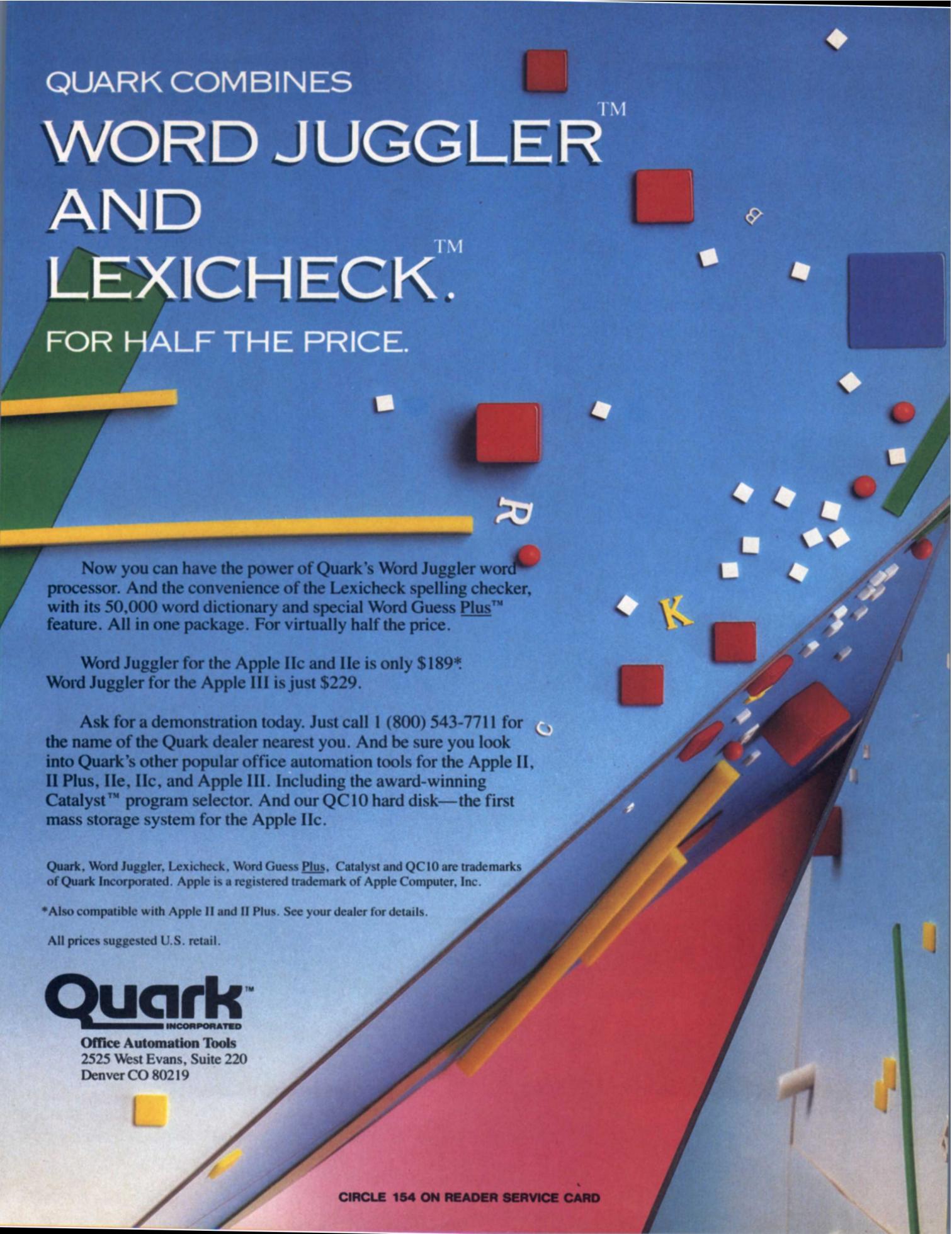
NIBBLE NOTCH COMPUTER PRODUCTS

DIVISION OF CORTAN INTERNATIONAL

4211 NW 75th TERRACE • DEPT. 54 • LAUDERHILL, FL 33319

PAT. PEND.

ALL TRADEMARKS ARE ACKNOWLEDGED



QUARK COMBINES
WORD JUGGLERTM
AND
LEXICHECKTM
FOR HALF THE PRICE.

Now you can have the power of Quark's Word Juggler word processor. And the convenience of the Lexicheck spelling checker, with its 50,000 word dictionary and special Word Guess PlusTM feature. All in one package. For virtually half the price.

Word Juggler for the Apple IIc and IIe is only \$189*.
Word Juggler for the Apple III is just \$229.

Ask for a demonstration today. Just call 1 (800) 543-7711 for the name of the Quark dealer nearest you. And be sure you look into Quark's other popular office automation tools for the Apple II, II Plus, IIe, IIc, and Apple III. Including the award-winning CatalystTM program selector. And our QC10 hard disk—the first mass storage system for the Apple IIc.

Quark, Word Juggler, Lexicheck, Word Guess Plus, Catalyst and QC10 are trademarks of Quark Incorporated. Apple is a registered trademark of Apple Computer, Inc.

*Also compatible with Apple II and II Plus. See your dealer for details.

All prices suggested U.S. retail.

QuarkTM
INCORPORATED
Office Automation Tools
2525 West Evans, Suite 220
Denver CO 80219

CIRCLE 154 ON READER SERVICE CARD

Radio Shack Presents In Learning:

Make learning exciting and innovative with software packages that help stimulate students to use a powerful resource: the imagination! Designed by The CTW Software Group, these two packages help first and second graders develop Language Arts and computer skills. CTW Software Group is a division of Children's Television Workshop—the creators of Sesame Street®, Electric Company™ and 3-2-1 Contact™.



A New Dimension Entertainment!

Play-With-Language™ (26-2538, \$99) consists of three learning modules that combine colorful graphics with text. Children practice sight and vocabulary words, sentence completion, and reading comprehension skills.

Picture Place! lets children change beginning vocabulary words into their picture counterparts while creating an imaginary scene.

Roll-A-Word helps children master word families and sentence completion. The child matches exciting visuals with words to create original sentences, poems and stories.

Bagasaurus strengthens reading comprehension and word play. By answering comprehension questions correctly, children collect words and pictures and use them in sentences to complete familiar fairy tales and nursery rhymes.

Hands On!™ (26-2539, \$99) consists of two learning modules. Each one builds computer-related skills, as well as encourages creative self-expression.

Blackboard lets students write with beginning word processing aids, such as insertion and deletion of text. The student learns to create, save and access disk files, and share them with other students.

Color It lets children create and manipulate shapes in ways unique to computer art. The child can change colors, get mirror images, turn images upside down, scroll images across the computer screen and more. Pictures can be saved and later used to stimulate storytelling or for other class exercises.

Learning Managers on the disk allow the teacher to individualize instruction. To further enhance classroom activities, each learning module contains diskettes, spirit masters, activity cards, a gameboard, a poster and a teacher's guide. Both packages will run on the TRS-80 32K Extended BASIC Color Computer 2 disk system.



For more information, stop by your nearest Radio Shack Computer Center, participating store or dealer. Or contact your Radio Shack Regional Educational Coordinator.

For the name of your full-time Regional Educational Coordinator, call 800-433-5682, toll-free. In Texas, call 800-772-8538.

Radio Shack®
The Name in Classroom Computing™
 A DIVISION OF TANDY CORPORATION
 CIRCLE 186 ON READER SERVICE CARD

For more information about Radio Shack's educational products and services, mail to:

Radio Shack, Dept. 84-A-241
 300 One Tandy Center, Fort Worth, Texas 76102

NAME _____
 SCHOOL _____
 ADDRESS _____
 CITY _____ STATE _____ ZIP _____
 TELEPHONE _____

Prices apply at participating Radio Shack stores and dealers.



SPECIALS

Apple:	IBM:	Commodore:	Atari:
Visicalc 160.00	PFS—Write/File/.....	Paper Clip/Spell Pack 94.95	Seven Cities of Gold 30.95
Handlers 84.95	Report/Graph 95.00 ea.	Home Accountant 49.95	Donkey Kong Junior 37.95
Word Handlers 36.95	Ultrafile 145.00	Multiplan 77.95	Bruce Lee 21.95
List Handlers 29.95	Prokey 99.95	Jumpman 29.95	Dimension X 25.95
Micro Sci Drive (A2) 224.95	WordStar Professional 499.95	Most Amazing Things 27.95	File Manager 74.95

APPLE GAMES

	Retail Price each	Your Price each
Broderbund		
Arcade Machine	59.95	41.95
Choplifter	34.95	24.95
Serpentine	34.95	24.95
Seafox	29.95	20.95
Gumball	29.95	20.95
Lod Runner	34.95	24.95
Spare Change	34.95	24.95
AE	34.95	24.95
Datssoft		
Zaxxon	39.95	27.95
Pooyan	29.95	20.95
Epyx		
Temple of Apsai	40.00	27.95
Jumpman	40.00	27.95
Upper Reaches of Apsai	19.95	16.95
Electronic Arts		
Music Construction Set	39.95	31.95
Pinball Construction	39.95	31.95
Hard Hat Mack	34.95	27.95
Axis Assassin	39.95	31.95
Standing Stones	39.95	31.95
One on One	39.95	31.95
Sky Fox	39.95	31.95
Archon	39.95	31.95
Infocom		
Zork I, II, III	39.95	27.95
Deadline	49.95	34.95
Starcross	39.95	27.95
Infidel	49.95	27.95
Suspended	49.95	37.95
Witness	49.95	37.95
Planetfall	49.95	37.95
Enchanter	49.95	37.95
Mind Systems		
Spitfire	39.95	31.95
Air Sim III	44.95	35.95
Odesta		
Chess	69.95	49.95
Odin	49.95	37.95
Origin		
Ultima III	54.95	43.95
Caverns of Calisto	39.95	31.95
Penguin		
Pie Man	29.95	21.95
The Coveted Mirror	34.95	24.95
Pensate	29.95	21.95
The Quest	34.95	24.95
Minit Man	29.95	21.95
Transylvania	29.95	21.95
Expedition Amazon	34.95	24.95
Sierra-On-Line		
Time Zone	99.95	69.95
Ultima II	59.95	41.95
Frogger	34.95	24.95
Dark Crystal	39.95	27.95
Sir-Tech		
Wizardry I	49.95	34.94
Wizardry II	34.95	24.95
Wizardry III	39.95	27.95
Crypt of Medea	39.95	29.95

Strategic Simulations

Computer Baseball	39.95	27.95
Epidemic	34.95	24.95
Carrier Force	59.95	41.95
Germany 1985	59.95	41.95
North Atlantic 86	59.95	41.95
Geopolitique 1990	39.95	27.95
Knights of the Desert	39.95	27.95
Ringside Seat	39.95	27.95
Broadsides	39.95	27.95
Eagles	39.95	27.95
Sublogic		
Night Mission Pinball	34.95	24.95
Flight Simulator II	49.95	39.95
Artsci		
Magic Window II	149.95	104.95
Beagle Brothers		
Silicon Salad	29.95	21.95
Utility City	29.95	20.95
Promito Dos	29.95	20.95
GPLE	49.95	39.95
Apple Mechanic	29.95	20.95
Disk Quick	29.95	21.95
Tip Disk #1	29.95	20.95
Beagle Basic	34.95	24.95
Alpha Pilot	39.95	27.95
Frame Up	29.95	20.95

BPI

The Business Analyst	195.00	146.50
Business Solutions		
Incredible Jack	179.00	134.95
Central Point		
Copy II	39.95	31.95
Continental		
Home Accountant	74.95	52.50
Tax Advantage	59.95	48.95
Dow Jones		
Market Analyzer	350.00	299.95
Hayden		
Applesoft Compiler Plus	99.95	69.95
Howard		
Tax Preparer 1984	250.00	199.95
Microtab		
Tax Manager	180.00	140.00
Microsoft		
Basic Compiler	395.00	295.00
Multitool Fin. Statement	100.00	80.00
Multitool Budget Analysis	150.00	112.50
Fortran-80 (CP/M)	195.00	157.00
Applesoft Compiler	21.95	175.00
Micro Sparc		
Macrosoft & Assembler	99.95	89.95

Monogram

Dollars & Sense	100.00	79.95
Pear		
Stock Portfolio Eval. Sys.	600.00	500.00
Penguin		
Transitions	49.95	37.95
Graphics Magician	59.95	41.95
Paper Graphics	49.95	37.95
Sensible		
Sensible Speller	124.95	87.95
Book Ends	124.95	90.95

APPLE BUSINESS/UTILITIES

Back It Up III	74.95	59.95
Image Printer II	49.95	34.95
Sierra-On-Line		
Homeworld	69.95	49.95
Screenwriter Professional	199.95	139.95
General Manager II	229.95	160.50
Software Publishing Corp.		
PFS-File	125.00	87.50
PFS-Report	125.00	87.50
PFS-Graph	125.00	87.50
PFS-Write	125.00	87.50
Southwestern Data		
Munch A Bug	49.95	34.95
Apple-DOC/List Master	39.95	31.95
Routine Machine	64.95	45.50
Stoneware		
DB Master Utility #1	129.00	97.50
DB Master Utility #2	129.00	97.50
DB Master 4.0	350.00	262.50
DB Master Stat Pac	129.00	97.50
Visicorp		
Advanced Visicalc	300.00	220.00
CBS		
Success with Math	24.95	19.95
Designware		
Spellicopter	39.95	31.95
Math Maze	39.95	31.95
Davidson & Associates		
Math Blast	49.95	39.95
Word Attack	49.95	39.95
Scarborough		
Master Type	39.95	31.95
Song Writer	39.95	31.95
Picture Writer	39.95	31.95
Scholastic		
Square Pairs	39.95	31.95
Turtle Trax	39.95	31.95
Spinnaker		
Story Machine	34.95	27.95
Facemaker	34.95	27.95
Kindercomp	29.95	23.95
Snooper Troops #1, #2	44.95	35.95
Alphabet Zoo	29.95	23.95

APPLE HARDWARE

Electrohome		
Hi Res RGB Monitor	699.00	414.95
Hayes		
Joystick Mach III (I+)	49.95	39.95
Joystick Mach III (Ile)	59.95	43.95
Hayes Microcomputer		
Micromodem II w/Term. Prog.	409.00	280.00
Kraft		
Joystick	64.95	48.95
Sweet Micro		
Mockingboard Sound	129.00	104.95
Mockingboard Sound & Speech	195.00	155.00

For Mail Orders: Include your selection(s), name, address, phone number along with your check, money order or credit card number and expiration date. Please include \$3.00 for shipping & handling (heavy items, hardware and foreign orders extra). California residents add 6½% sales Tax.

ORDER DESK

National: 800-942-2058
California: 800-223-8327

Alaska & Hawaii: 415-237-4406
Hours: 8 a.m. to 6 p.m. PST



**For Order Status & Technical
Information Call:
415-237-5283**

In Bay Area visit

SOFTWARE SOLUTIONS™

11185 San Pablo Ave, El Cerrito, CA 94530
(415) 237-5257 Hrs: M-Sat 10 a.m. to 6 p.m.



NONAGONTM SOFTWARE

P.O. Box 1486

El Cerrito, CA 94530

CIRCLE 130 ON READER SERVICE CARD

July 1984 © Creative Computing

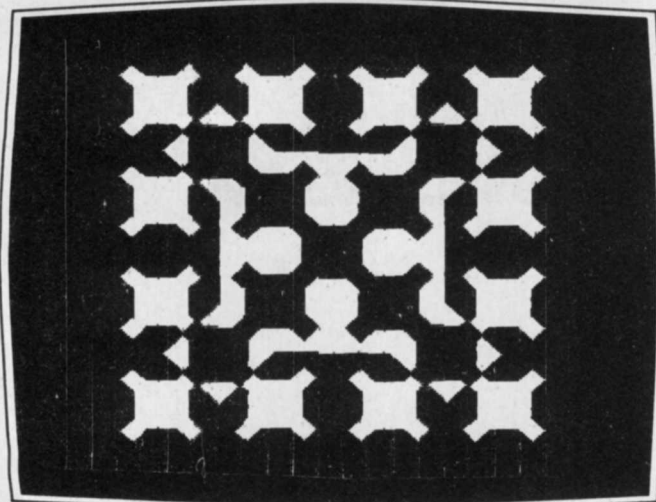


Figure 16. First to third order curve painted from the center and outside.

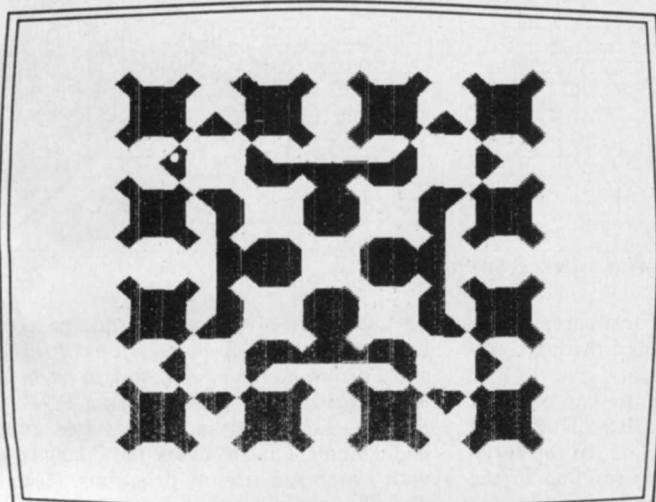


Figure 17. Reversed image of Figure 16.

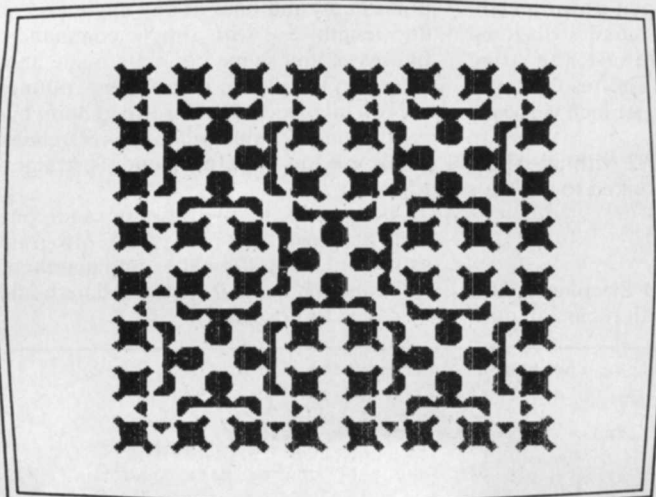


Figure 18. Second and fourth order curve painted from the center and outside.

WRITE YOUR OWN APPLE GAMES

Includes 40 exciting
pre-programmed games
to get you started!

Write Your Own Apple Games is your ticket to thousands of hours of solid game fun.

But it's more than just a game book. While you're enjoying more than 40 exciting new programs, you'll be learning—quickly and easily—the most advanced techniques of computer game design.

In *Write Your Own Apple Games*, Stuart Anstis explains each game to you in logical, step-by-step subroutines. You'll see crucial game graphics exactly as they should appear on your screen.

Then you'll learn how to rearrange the basic subroutines to create countless game variations.

If you know BASIC, you're ready to learn state-of-the-art game techniques, including how to:

- Create smooth, flicker-free screen movement
- Generate flashing "neon-sign" graphics
- Keep game scores
- Use random numbers in game design—and make your computer come alive as an opponent
- Zero in on random time delays—a challenge to even the most sophisticated arcade player

And much more.

Write Your Own Apple Games gives you all the skills you need to start designing your own original computer games for fun—and profit!

And because writing your own games gives you greater control of your Apple's numerical and graphic capabilities, you'll be opening the door to fantastic new possibilities for using your computer.

Write Your Own Apple Games should sell for over \$1,000—the cost of 40 pre-packaged games.

But you can get *Write Your Own Apple Games* for only \$12.95. That's less than 32 cents a game—and every game you write yourself is virtually free!

Start having some serious fun with your Apple computer. Send for your copy of *Write Your Own Apple Games* today.



MAIL TODAY TO: CREATIVE COMPUTING PRESS

Dept. MA9H
39 East Hanover Avenue
Morris Plains, N.J. 07950

Please send me _____ copies
of *Write Your Own Apple
Games* for only \$12.95 each,
plus \$2.00 shipping & handling per book. #2W.

Total amount \$_____

☐ **Payment Enclosed.** (CA, NJ and NY State residents please add applicable sales tax).

☐ **CHARGE MY:** ☐ American Express ☐ MasterCard ☐ Visa

Card No. _____ Exp. Date _____

Signature _____

Name _____ (Please print)

Address _____

City _____ State _____ Zip _____

*Outside the U.S.A. add \$3 for shipping and handling.

☐ Check here to receive FREE catalog of computing books, magazines and guides.

For faster service, **PHONE TOLL FREE: 800-631-8112**
(In NJ only: 201-540-0445)

Also available in your local bookstore or computer store.

Transformation and Rotation of Hilbert and Sierpinski Curves

The Plot Thickens

William Fujimoto

Personal computers and low cost plotters have opened the door to fascinating graphics for people like me who can now create drawings that would be impossible to produce freehand.

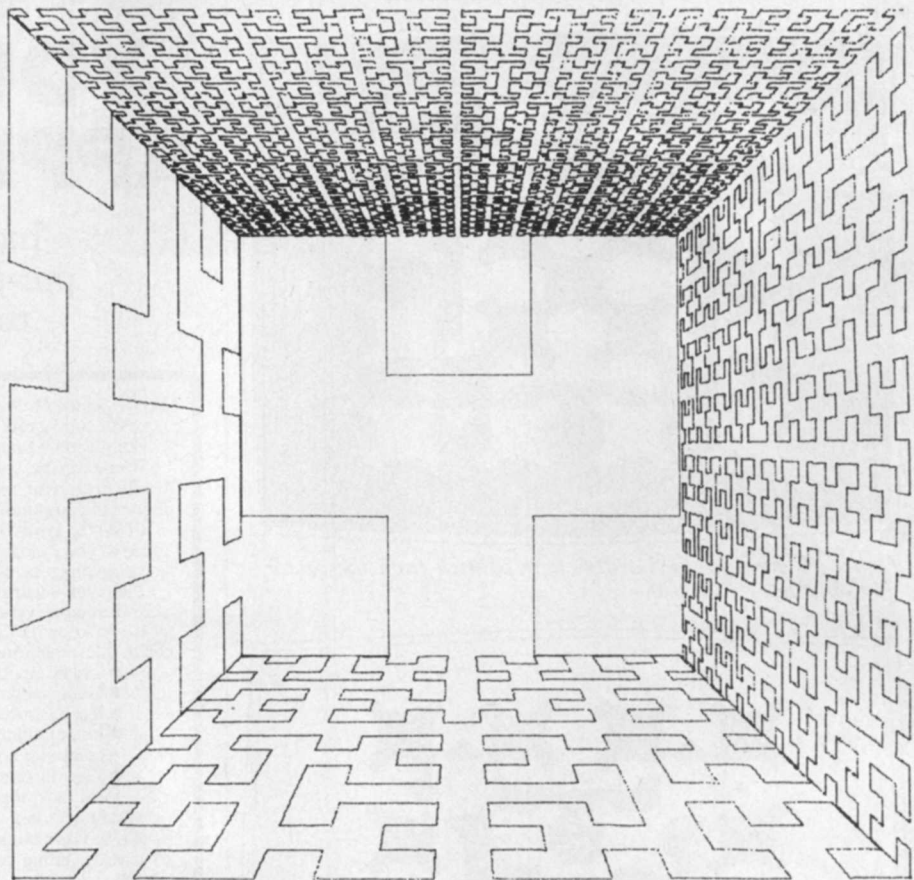
This article describes a method for plotting Hilbert and Sierpinski curves and rotating and transforming them to achieve interesting effects.

Hardware

The plotter I use is an Houston Instruments DMP-2. Except for an etch-a-sketch, there is probably not a more basic or "dumber" plotter in existence. The available commands for it are few. They are pen up, pen down, and move one step in one direction. The pen can move in eight directions which are increments of 45 degrees. Think of them as points of the compass (i.e., N, E, S, W and NE, SE, SW, NW).

Unlike some inexpensive plotters currently available, you cannot explicitly tell the pen on this device to move from one arbitrary point to another. It has no "home" or 0,0 point; positions such as these can be reached manually by turning two knobs on the side of the machine until the desired spot is reached.

The DMP-2 has no ASCII character generator nor any built in plots for curves



Cube made of Hilberts with orders 2 through 6.

or figures such as circles or squares. These functions must be obtained through software if needed.

Connection to a computer can be made with either parallel or RS-232 lines. I currently use the serial line. In the serial mode a step is made by sending to the DMP-2 a lowercase letter from p through w, and pen up or pen down with lowercase y and z, respectively. For example, a vertical line (direction north) 10 steps long is drawn by sending a pen down and 10 p's—zpppppppppp. To make a diagonal line 5 steps to the southwest, the string zuuuuu would be sent. The resolution of this machine is 200 steps per inch vertically and horizontally.

I have used the DMP-2 with an Apple and at present have it hooked to an Altos 8600 at serial port two.

Software

To make Hilbert and Sierpinski plots easily, some language with recursion must

be used. Since recursion is not part of Basic or Fortran (*Some versions of Basic and Fortran do have recursion, in particular, MBasic, MSX Basic, and PDP-11 Basics.—Ed.*) and since the Altos runs under Xenix, I had available the C language with which to write my programs. Pascal and PL/1 are alternatives.

In addition to the two recursive plotting programs themselves, I developed routines in C for drawing circles, point-to-point lines, and lines at any angle and of any length. So, with simple commands, figures of any shape could be made anywhere on the plotter area. These routines are too involved to be described here, but are thoroughly explained in the references. Their use, on the other hand, is straightforward.

As an example, to draw a hexagon one inch on a side the part of a C program shown in Listing 1 could be implemented. A C function made from those lines could be called as hexagon().

```
/* first manually move the pen to the starting point */
side = 200; /* 200 steps per inch */
pendown();
for (line=1;line<=6;line++) { /* loop six times */
    move(side); /* move an inch */
    turn(60); /* make a 60 degree left hand turn */
}
penup();
```

Listing 1.

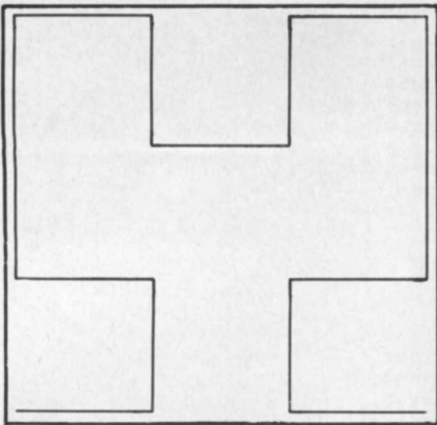


Figure 1. Hilbert order 2.

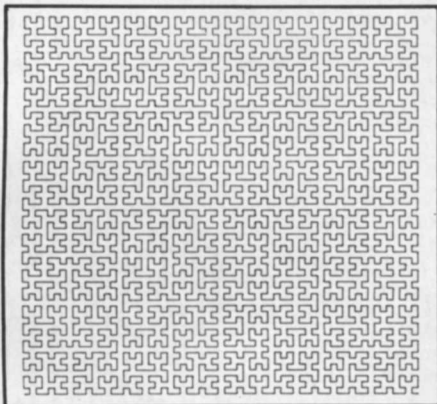


Figure 2. Hilbert order 6.

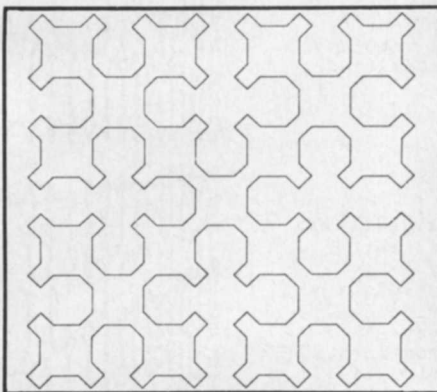


Figure 3. Sierpinski order 2.

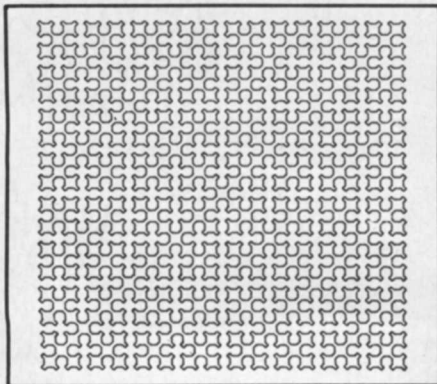


Figure 4. Sierpinski order 4.

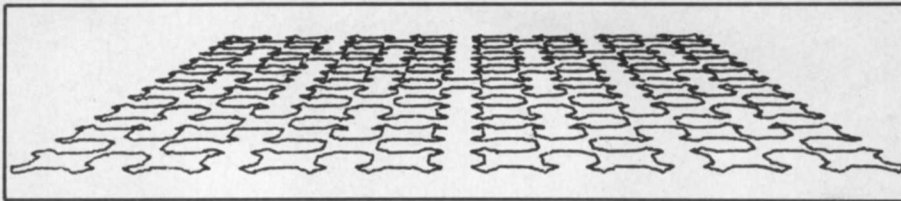


Figure 5. Sierpinski order 3; rotated backwards with perspective.

The Plots

Using Wirth's algorithms and the line drawing routines, I was able to make the Hilbert and Sierpinski curves. Notice that the Hilbert has a beginning and an end point, while the Sierpinski is a closed curve. Orders 2 and 6 (Figures 1 and 2) are shown for the Hilberts, and 2 and 4 (Figures 3 and 4) for the Sierpinskis.

Even though these plots are nice in themselves, it occurred to me that giving them some depth might make them more interesting. What would it look like if one of these patterns were, perhaps, painted onto a frozen lake and viewed from the air? I attempted to have the DMP-2 draw this imaginary form.

Using the mind's eye, picture one of the plots being rotated and translated in space. The computer can simulate these motions with matrix transformation. A transformation is a mathematical way of turning and moving points in space as if real shapes were being manipulated. With 4 x 4 arrays and a three-dimensional cartesian coordinate system, projections of these points can be made by the plotter. The result is what one would expect of an object drawn on a flat piece of paper. Again, look in the references on graphics for details (Figure 5).

Now if the point $X=0$, $Y=0$, and $Z=0$ is at the center of the Hilbert plot, then it is possible to stretch it around a sphere (which, you recall, is represented by the equation $R^2 = X^2 + Y^2 + Z^2$). Whenever X and Y are within the sphere, a Z is calculated, otherwise $Z=0$. A transformation moves the apparent viewpoint to the left edge and another tilts it backward producing a surface with a spherical concavity in it. A third transformation gives it the desired perspective (Figure 6).

To make the Hilbert sided box with orders 2 to 6 (see the title illustration), it was just a matter of generating, rotating, and shifting the individual plots. The view

is through the middle of the box from a position face on.

Other Projects

Curves similar to Sierpinskis and Hilberts that can also be plotted are dragons, flow snakes, and other monster curves.

One other possibility is to synthesize 3-D pictures by looking through red and blue filters at red and blue drawings. Appropriate rotations and translations produce an image with apparent depth.

Another possibility is to have the plotter draw pictures for an animated movie. At

What would it look like if one of these patterns were painted onto a frozen lake and viewed from the air?

one picture per frame and 24 frames per second, the total is 7200 drawings for a five-minute film!

References

1. J.C. Beatty and K.S. Booth, *Tutorial: Computer Graphics*, IEEE Computer Society Press, Silver Spring, MD, 1982.
2. J.D. Foley and A. Van Dam, *Fundamentals Of Interactive Computer Graphics*, Addison-Wesley, Reading, MA, 1982.
3. M. Gardner, "Mathematical Games," *Scientific American*, December 1976, pp. 125-133.
4. W.M. Newman and R.B. Sproull, *Principles Of Interactive Computer Graphics*, McGraw-Hill, New York, 1973.
5. D.F. Rogers and J.A. Adams, *Mathematical Elements For Computer Graphics*, McGraw-Hill, New York, 1976.
6. N. Wirth, *Algorithms + Data Structures = Programs*, Prentice-Hall, Englewood Cliffs, NJ, 1976.

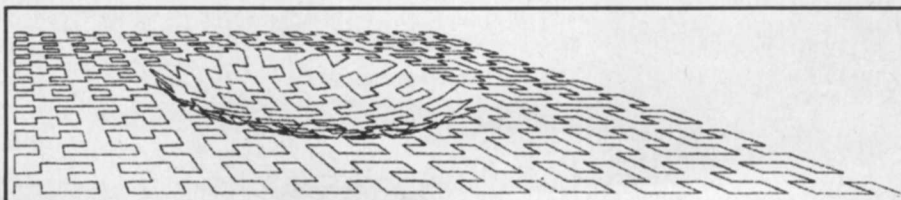


Figure 6. Hilbert order 5; wrapped around a sphere; moved right; rotated backwards with perspective.

Listing 2. Listing in C to produce a sierpinski curve.

```

/* Sierpinski curve maker.
/* each side has this shape \____/ with a short
/* connection between them.
*/

main(argc,argv)
int argc;
char *argv[];
{
    FILE *fopen();
    char *plt;
    int i,z,x0,yy0,n;
    plt = "/dev/tty2";
    fp = fopen(plt,"w");
    y = 0;
    angle = 0;
    dist = 0;
    i = 0;
    xpos = 0;
    ypos = 0;

    /* go to starting position

    n = atoi(argv[1]);
    h=H0/4;
    x0= 2*h;
    yy0=3*h;
    for(z=0;z<=n;++z) {
        i++;
        x0 = x0 -h;
        h = h/2;
        yy0 = yy0 + h;
    }
    x=0;
    y = yy0;
    penup();
    moveto(x,y);
    pendown();
    side1(i);
    x=x+h;
    y=y-h;
    moveto(x,y);
    side2(i);
    x=x-h;
    y=y-h;
    moveto(x,y);
    side3(i);
    x=x-h;
    y=y+h;
    moveto(x,y);
    side4(i);
    x=x+h;
    y=y+h;
    moveto(x,y);
    fclose(fp);
}

side1(i)
int i;
{
    if (i>0) {
        side1(i-1);
        x=x+h;
        y=y-h;
        moveto(x,y);
        side2(i-1);
    }
}

```

```

        x=x+2*h;
        moveto(x,y);
        side4(i-1);
        x=x+h;
        y=y+h;
        moveto(x,y);
        side1(i-1);
    }

    side2(i)
    int i;
    {
        if (i>0) {
            side2(i-1);
            x=x-h;
            y=y-h;
            moveto(x,y);
            side3(i-1);
            y= y-2*h;
            moveto(x,y);
            side1(i-1);
            x=x+h;
            y=y-h;
            moveto(x,y);
            side2(i-1);
        }

        side3(i)
        int i;
        {
            if (i>0) {
                side3(i-1);
                x=x-h;
                y=y+h;
                moveto(x,y);
                side4(i-1);
                x=x-2*h;
                moveto(x,y);
                side2(i-1);
                x=x-h;
                y=y-h;
                moveto(x,y);
                side3(i-1);
            }

            side4(i)
            int i;
            {
                if (i>0) {
                    side4(i-1);
                    x=x+h;
                    y=y+h;
                    moveto(x,y);
                    side1(i-1);
                    y=y+2*h;
                    moveto(x,y);
                    side3(i-1);
                    x=x-h;
                    y=y+h;
                    moveto(x,y);
                    side4(i-1);
                }
            }
        }
    }
}

```

SCRG

SWITCH-A-SLOT



The **SWITCH-A-SLOT** is an expansion chassis, which allows the user to plug in up to four peripheral cards at one time. One of these cards is selected for use, and only that card draws power.

This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

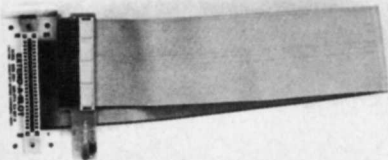
- Allows up to four peripheral cards to be plugged into one peripheral slot.
- User selects desired card by front panel rotary switch.
- Only selected card draws power.
- Plugs into any peripheral slot.
- Saves wear and tear on delicate connectors.
- 18" cable connects Switch-a-slot to computer.

New—resistive terminations for better response

\$179.50 **36" Cable \$189.50**

SWITCH-A-SLOT and **EXTEND-A-SLOT** work well with all slow to medium speed cards, such as Modems, Printers, Clock, 80 Column, Music, etc. They are not recommended for high speed data transfer devices such as disk drive controllers, alternate processor, and memory cards. These products may be incompatible with some alternate processor cards.

EXTEND-A-SLOT



The **EXTEND-A-SLOT** brings a slot outside your APPLE[®], allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability.

The perfect accessory for:

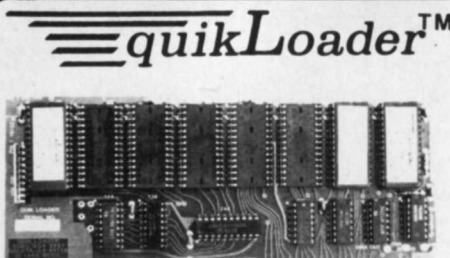
Owners of large numbers of I/O expansion cards—keep your frequently used cards installed. Use the **EXTEND-A-SLOT** for the others.

Technicians—easy access to test points on accessory cards under actual operating conditions.

Experimenters—make easy changes to cards while card is installed.

EASY TO USE—just plug it in as you would any expansion card, then plug your card in. When you want to change cards, do it easily outside the computer, without the wear and tear on the computer expansion slot.

\$34.95



Designed by Jim Sather

SPEED

The quikLoader is the *fastest* way to load programs. **BAR NONE!** Applesoft, Integer, or machine language programs can be loaded in fractions of a second. More importantly, DOS is instantly loaded every time the computer is turned on. Integer is even loaded in the language card. This process takes less than a second, saving valuable time. The quikLoader operating system can keep track of over 250 programs stored in **PROMs** (Programmable Read Only Memory). The user simply transfers any of these programs to PROM using the instructions packed with the unit, and any PROM programmer, or we will provide this service.

CONVENIENCE

How many times have you started to work with a frequently used program, only to find that you have misplaced the disk, or worse, had the disk damaged, or the dreaded "I/O ERROR" message flash on the screen. With the quikLoader, these nightmares can be a thing of the past. Frequently used programs are available *instantly* when you need them, without having to look for the disk, or hoping that the lengthy disk loading procedure goes smoothly. If you do need to use standard disks, the quikLoader even speeds up that process. For example, to catalog a disk, just press ctrl-C Reset. To run the "HELLO" program, press ctrl-H Reset. Other "one-key" commands include entering the monitor, booting the disk, calling up the mini-assembler, etc. The major difference between the

quikLoader and the other ROM cards is the complete operating system (in PROM). This enables you to get the quikLoader catalog on the screen (by pressing ctrl-Q Reset), allowing you to see what programs are available. Loading or running of the desired program requires one keypress. Program parameters, such as starting address and length of machine language programs can be seen on the catalog screen, if desired.

VERSATILE

The quikLoader will accept any of the popular PROMs available on the market, 2716, 2732, 2764, 27128 and 27256. These types may be freely intermixed on the card. Long programs can take up more than one PROM, or several short programs may be stored on one PROM. The quikLoader operating system even handles multiple cards, so you can easily double or triple the amount of PROM memory available. The ultimate memory capacity of one card is 256K, so many frequently used programs and utilities can be stored. We even start your library of programs with the most popular utilities on the card, FID and COPY. Now, if you have to copy a disk, you don't have to search for the master disk. You can start copying within 3 seconds after turning on the computer.

INCREASED DISK CAPACITY

Since DOS is loaded from the quikLoader every time the computer is turned on, it is not necessary to take up valuable disk space with DOS. This will give you more than 10% additional space for programs and data on your disks.

SYSTEM REQUIREMENTS

The quikLoader plugs into any slot of the APPLE][+ or //e. If used in a][+, a slightly modified 16K memory card is required in slot 0. A disk drive is required to save data.

DOS, INTEGER BASIC, FID, and COPY are copyrighted programs of APPLE COMPUTER, INC. licensed to Southern California Research Group to distribute for use only in combination with quikLoader.

\$179.50

**NOW AVAILABLE FOR quikLoader:
DOUBLE-TAKE By Beagle Bros. Inc.
COPY II PLUS By Central Point Software, Inc.
More Programs Coming Soon**

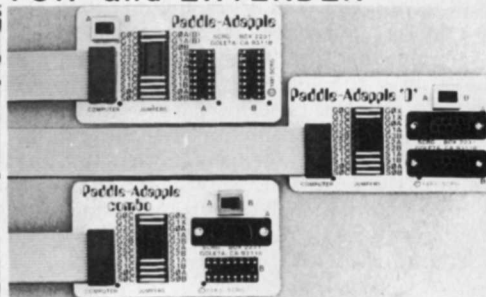
Paddle-Adapple

GAME I/O ADAPTOR and EXTENDER



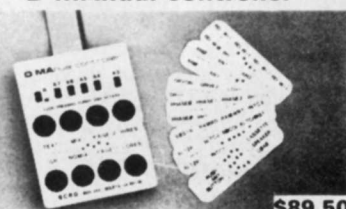
- Works with all Apple compatible joysticks, paddles and other I/O devices.
- Select one of two devices or . . .
- Use 4 paddles simultaneously.
- Unique "Jumpers" socket allows you to configure to meet your needs.
- BPI[®] users can have BPI[®] device and paddles plugged in simultaneously. (**Paddle-Adapple** and **Paddle-Adapple Combo** only).
- Gives you four push-button inputs.
- Supports shift key modification.
- Exchange X & Y joystick axis.
- Small and compact — adheres to computer with supplied foam tape.
- All Strobes, annunciators and power available on all 16 pin connectors.
- Supplied with 18" cable.

\$29.95



The **Paddle-Adapple** has two 16 pin sockets. The **Paddle-Adapple "D"** works with the subminiature D connectors. The **Paddle-Adapple Combo** has one 16 pin socket and one subminiature D connector.

D Manual controller



\$89.50

See us at the Computer Expo — Portland, Oregon, June 14-17

**SIX MONTH WARRANTY • TEN DAY RETURN PRIVILEGE
TOLL-FREE ORDER LINES**

in CA (800) 821-0774

(800) 635-8310

all other states (including AK, HI, VI, & PR)
Information & technical questions: (805) 685-1931

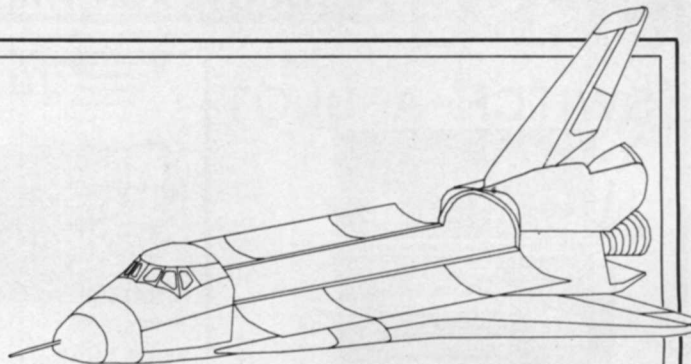
Available at your local dealer or direct from:

So. Calif. Research Group
P.O. Box 2231 - C
Goleta, CA 93118
(805) 685-1931

VISA, MASTERCARD accepted APPLE is a trademark of APPLE COMPUTER, INC.

Add \$2.50 for shipping
\$5.00 outside U.S.A. &
Canada, CA add tax.

Plots About Plotters



Since this issue of *Creative Computing* is devoted largely to graphics, it seemed appropriate for our Print About Printers column to become Plots About Plotters.

We performed in-depth evaluations of two plotters, an eight-pen unit from Roland, and a single-pen unit from Enter Computer. The Roland unit is very similar to their one-pen plotter and our comments apply to both units. Enter Computer recently introduced a six-pen plotter; we have included it in the chart and have some comments about it, but we did not do a hands-on evaluation.

Of the many plotters we have evaluated over the years, seven are still the current models. Question to readers: would you like a roundup of these and all other currently available plotters in a future issue? More than just specifications, this would include our impressions and, in two cases, results from long-term use (sort of a 24,000-mile evaluation).

Roland X-Y Plotters

Roland DG Corp. manufactures two plotters, the DXY-800 (eight pens) and DXY-101 (one pen), specifically for use with microcomputers. Unique among small plotters, the units can be used in either a horizontal or vertical position. We tested the DXY-800; however, most of our comments apply to both units.

Out of the Box

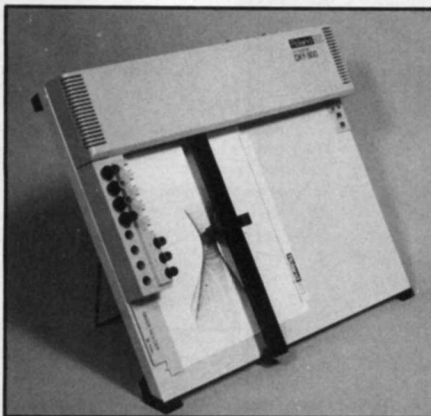
Packed with the plotter are eight colored pens, four pen holders (for standard nylon-tip pens), a stand (to hold the plotter in a vertical position), a power supply, and a manual. The only thing not included are an interface cable and paper.

David H. Ahl

The plotter measures 17" x 19.5" x 3"; an external power supply has two cables, one to the plotter and one to the outlet. In the horizontal position, the plotter occupies 16" x 20" of desk space; using the heavy wire stand to put the plotter in a vertical position, the footprint shrinks to 10" x 20".

The largest paper accepted is 420 x 297mm (apparently a standard European size). The corresponding U.S. dimensions are 16.5" x 11.7"; the nearest standard size in the U.S. is 17" x 11".

Although the manual seems to suggest that plots can be drawn on the entire 420 x 297mm surface of the paper, this is not the case. The maximum area for plotting is 350 x 260mm (approx. 13.8" x 10.2"). The DXY-101 has a maximum x dimension of 370mm (14.6").



Roland DXY-800 plotter can operate in a near vertical position.

Two convenient magnetic strips hold the paper in place on the right and left. For large plots we would have appreciated additional strips for the top and bottom. These are available as extra cost options, although we found that masking tape worked just fine.

On the back of the plotter (assuming horizontal placement) are several connectors and switches. The plotter can accept input through a parallel (Centronics) or serial RS-232 port. For serial operation, DIP switches are used to select the baud rate, parity, data bits, and stop bits. We tried both interfaces and had no problems with either one.

A push button off/on power switch is found on the back. In addition, at the top right of the plotter bed are two other switches (Pen Up/Pen Down and Home) and two LEDs (Power On and Pen Up).

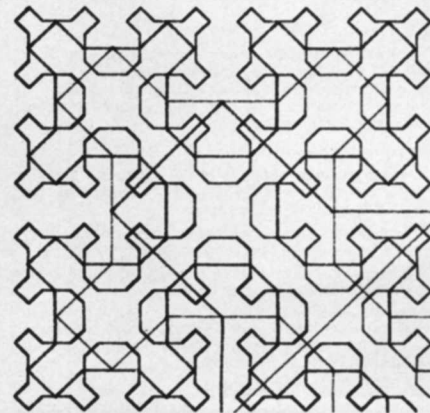
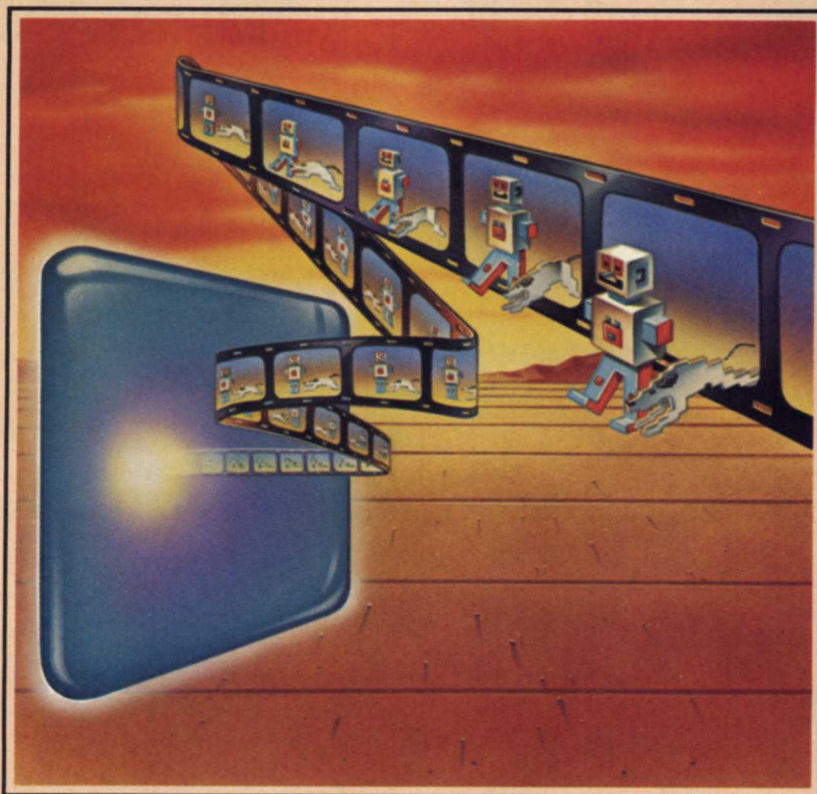


Figure 1. Portion of a Sierpinski curve done on the Roland DXY-800. Only the PRINT statements had to be changed in the program originally written for the Houston Instruments DMP-29.



*You imagine
and a cast appears on the screen
You compose
and music and sound are heard
You direct
and an original story unfolds
You are a MovieMaker.™*

Creative Pastimes.™ Software as unique as you are.

Look for Creative Pastimes Software in your favorite book or computer store. You'll find it's suitable for all ages, and compatible with most popular home computers. For more information call us at (800) 336-0338. Or write Reston Computer Group, A Prentice-Hall Company, 11480 Sunset Hills Road, Reston, Virginia 22090. MovieMaker is a registered trademark of Interactive Picture Systems, Inc.



*The
Dolphin's Pearl*



MovieMaker



Day



*Middle of the
Road Lizard*



THE PERSONAL PRINTER BUILT LIKE A SHERMAN TANK PERFORMS LIKE A STRADIVARIUS.

A Tough Act To Follow. Frankly, an Okidata printer is the best printer on the market today. Why? We pack more performance features per dollar into our dot matrix printers than anybody. Bar none. Data processing at speeds from 80 to an incredible 350 characters per second. Exceptional letter quality printing at three times the speed of most daisywheels. Draft and color printing. High resolution all points addressable graphics for charts, graphs, illustrations and photos. Even alternate character sets for self-designed typefaces and symbols. (Print a G-clef, if you like.)

Long-Term Engagement. Our high performers are the most reliable

printers available, with rugged steel frames, laser-welded parts, and a print head (the most vital part of all) so strong we guarantee it for up to one full year. No wonder our warranty claim rate leads the industry at less than 1/2%.

Perfect Harmony With Your Computer. Every Okidata printer works in concert with the major names in personal computers. Better and faster, in fact, than the major computer name printers. (Which, by the way, aren't even made by the major computer companies.)

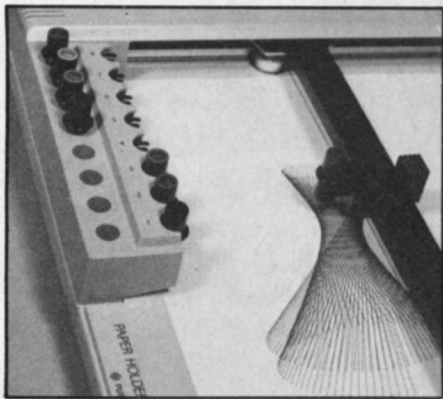
Best Selection. Right Price. Nobody offers you a better choice. There are eight Okidata printers in all,

ranging in price from \$299 to \$2995, suggested retail. Suggest you call us at 1-800-OKIDATA. In New Jersey, (609) 235-2600. Or write OKIDATA, Mt. Laurel, NJ 08054.



OKIDATA
an OKI AMERICA company

CIRCLE 151 ON READER SERVICE CARD



Pen holders hold active pens while pens (with their caps on) can be stored on the receptacles to the left.

Eight pen holders are at the top left of the plotter bed. Each one holds a Roland pen or a standard pen holder. We tried a Pilot Razor Point pen with good results, although we can't see any reason not to use the included pens. Included colors are black, red, blue, green, pink, orange, purple, and brown.

Plotting is accomplished by means of a vertical bar which moves from right to left with a pen holder that moves up and down along the bar. Step size is 0.1mm (0.004") and repetitive accuracy is 0.3mm (0.012"); in actual use, we found the plotter performed well within this limit, even with pen changes to other colors.

Like other plotters, the DXY-800 is fairly noisy in operation, particularly when making a series of small steps or pen up/pen down movements.

Drawing Commands

The plotter recognizes 20 commands. All commands are a single letter, although all but one require one or more arguments. Home (H) is the only single letter command; it moves the pen to the 0.0 position.

Two commands, Draw (pen down) and Move (pen up), cause the pen to move to a position specified by x-y co-

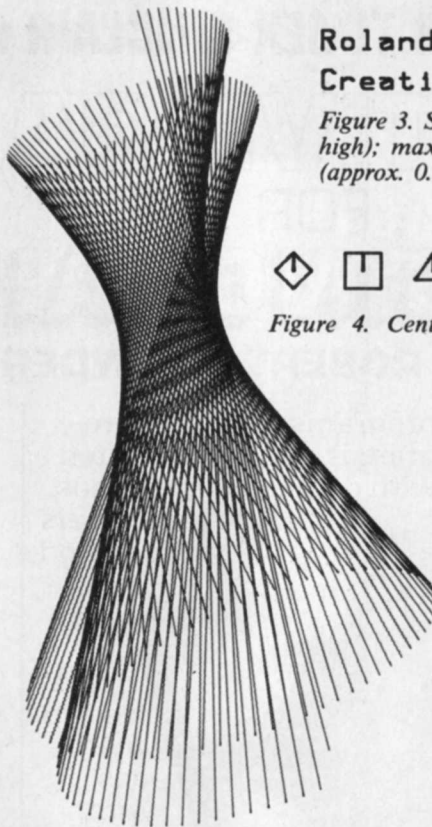


Figure 2. Rotating cone drawn with a nine-line program from page 27 of the Roland manual.

ordinates. As there is no scaling, these coordinates must be specified in integers representing 0.1mm (max. 3500 x 2600).

The Increment command draws an incremental distance from the last pen position; the Relative command performs the same operation with the pen up.

The Line command draws solid or dashed lines with variable spacing. The Axis command draws hash marks along an x or y axis.

A group of four commands is used to draw alphanumeric characters and ten graph symbols in any of 15 different sizes (0.7 to 11.2mm high) and four directions (0, 90, 180, 270 degrees).

A group of four commands is used to

Roland DXY-800 Plotter

Creative Computing Evaluation

Figure 3. Sample print in size 3 (2.8mm high); maximum letter size is 11.2 mm (approx. 0.44").



Figure 4. Centering marks in size 12 (5.2mm square).

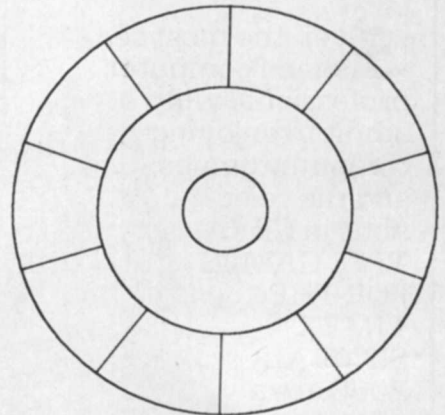
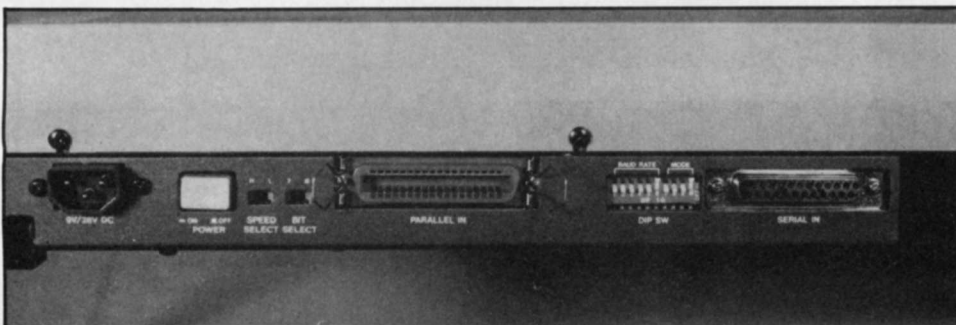


Figure 5. Figure was drawn with a five-line program; circular division lines of any length can be drawn with a single command.

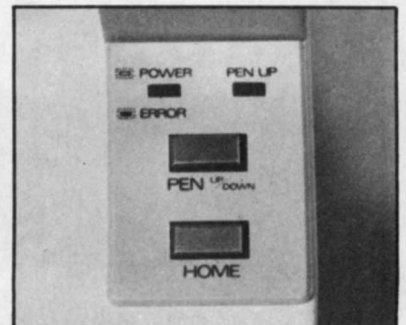
draw circles and arcs in either absolute or relative locations. Arc angles are specified in degrees rather than radians—a welcome feature. On the other hand, these commands can draw only circles (or portions) and not ellipses (which are possible on some other plotters). A related command is "K" which draws division lines (like hash marks) in a circular pattern.

Finally, the "T" command draws hatching (series of slanted lines for shading enclosed areas) within any defined rectangular area.

This is a comprehensive command set, although compared to a plotter such as the Houston Instruments DMP-29, the



Rear panel includes serial and parallel connectors, DIP switches for setting serial protocols, and power switch.



Two indicators and switches are to the upper right of the plotting bed.

INCREASE YOUR TIMEX-SINCLAIR ENJOYMENT

CREATIVE GAMES

FOR THE

TIMEX-SINCLAIR 2068

BY ROBERT MAUNDER

Even the most seasoned computer professional will admit to enjoying computer games, and the selections in CREATIVE GAMES FOR THE TIMEX-SINCLAIR 2068 are a mix of completely original games as well as some old favorites.

Over 21 games, including number, simulations, dice, card and grid games are introduced to allow you to use your Timex-Sinclair 2068 more fully, whether you're a first timer or an experienced user.

For beginners, there is a simple guide to entering

programs, and each program is clearly presented with detailed instructions.

Advanced users will find complete program design methods, with each game program explained

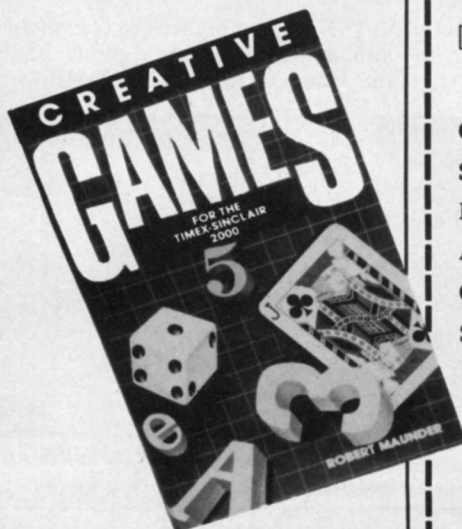
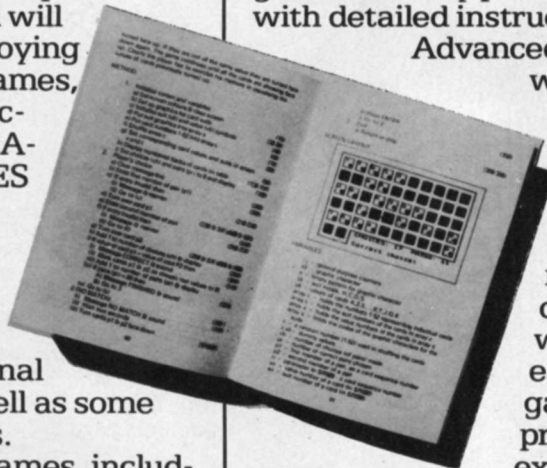
and documented fully, including programming techniques and notes. You



will progress from just playing games to understanding their structures, modifying them and creating your own.

CREATIVE GAMES FOR THE TIMEX-SINCLAIR 2068 is a self contained guide, allowing you to enjoy your color computer, while learning to use it more extensively.

Order your copy today!



CREATIVE COMPUTING PRESS

Dept. MD7F, 39 East Hanover Avenue, Morris Plains, NJ 07950

Please send me _____ CREATIVE GAMES FOR THE TIMEX-SINCLAIR 2068 at \$7.95* plus \$2.00 postage and handling each. Outside USA add \$3.00 per order. #2T.

☐ Payment enclosed \$_____. *Residents of CA, NJ and NY State add applicable sales tax.

☐ Charge my:

☐ American Express ☐ Visa ☐ MasterCard
(\$10. minimum for charge and phone orders.)

Card No. _____ Exp. Date _____

Signature _____

Mr./Mrs./Ms. _____ (please print name in full)

Address _____

City _____

State _____ Zip _____

☐ Send me a FREE Creative Computing Press Catalog.

For faster service, PHONE TOLL FREE

1-800-631-8112

(In NJ only call 201-540-0445)

Also available in your local bookstore or computer store.

Plots About Plotters, continued...

Roland DXY units are "missing" several useful commands. Lacking, for example, are commands to reset the plotter, draw ellipses, draw different types of lines (other than solid and dashed), do scaling, change the pen speed, change the step size, and connect points of an irregular curve. Even without these commands, the Roland plotters are quite versatile; nevertheless, certain types of plots will require more programming than they would using a plotter with more built-in "intelligence."

Documentation

The Roland plotter comes with a 31-page manual which we rank as adequate—no more, no less. As far as interfacing, if you are connecting the plotter to an Apple, TRS-80, or IBM PC with standard parallel interface, the instructions are complete. (Actually, they are fine for a parallel connection to any computer, although only the above three are mentioned.) If you plan to use a serial interface, the manual provides the necessary information, although it is quite technical. IBM PC and Apple cable connections are given, but no others.

Seven pages of the manual are devoted to a short description of each command along with a short program listing and a sample plot. Our applause to Roland for including this detail, something sadly lacking in the documentation of nearly every other plotter we have evaluated.

One-half a page is devoted to describing the printer mode (using the plotter to print text); we found it inadequate. We also felt that the single page devoted to error indication and recovery could have been expanded.

Good Price Performance

While the Roland DXY-800 does not have all the features of some other plotters, neither is it as expensive. Indeed, in the under \$1000 price range, the DXY-800 is one of the few plotters able to handle 11" x 17" paper and eight pens. The pen holders for standard pens are a nice plus as are the built-in parallel and serial interfaces. Furthermore, with the upright stand, it has the smallest footprint of any unit that can handle 11" x 17" paper. We can't attest to its longevity, although it appears to be ruggedly built. The bottom line: for under \$1000, the Roland DXY-800 is an excellent buy.

For business graphics, Roland offers a comprehensive software package which automatically produces line, bar, and pie charts according to your specifications. Furthermore, it has the capability to read files from popular spreadsheet packages and graph the data. This package sells for \$375. When it was first in-

troduced in April, Roland offered an attractive package price which included both the plotter and software; you might want to ask your dealer if this is still available.

CIRCLE 427 ON READER SERVICE CARD

Sweet-P Model 100

The Sweet-P Model 100 "Personal Plotter" by Enter Computer Inc. is one of the smallest units on the market. It achieves its compactness by means of a novel plotting mechanism that moves the paper back and forth on precision rollers while moving the pen from side to side. As a result, it occupies only 14" x 9" of desk space, but can produce plots on 8½" x 11" paper.

Complete As It Comes

The Sweet-P plotter comes complete with everything needed for immediate operation: manual, 12 colored pens, interface cable, packet of paper, and disk of software (for Apple or IBM PC). Although the plotter is supplied with either Apple or IBM PC cable and software, it will work with any computer. In some cases you may have to use a different cable. The plotter comes with a parallel interface only.

Hint: the Apple cable will work with TRS-80 Model 100 and NEC 8201 notebook portables while the IBM cable will work with any computer with a DB-29 connector (RS-232 type) on the parallel output port. It would have been useful if Enter had made available a cable for the plotter with a standard Centronics connector for use with the many computers that have this connector.

As mentioned, the plotter is very compact. In operation, however, you must provide sufficient space in the front (5")

and rear (6") for the paper to slide back and forth.

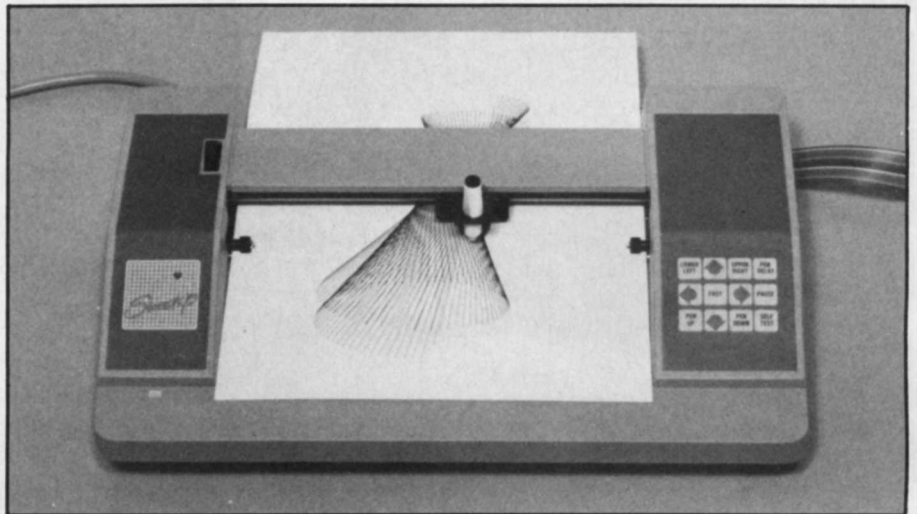
Under normal circumstances, most users will use 8½" x 11" paper. However, the mechanism is such that it can accommodate roll or fanfold paper (8½" wide). Active plot dimensions, no matter what length paper is being used, are 7.35" x 10". Step size is 0.004" and there are 2500 steps in the X direction and 1838 steps in the Y direction.

The paper is held in place by two rubber rollers at either end of the platen. We found the mechanism was equally adept at handling 50# coated stock, projector transparencies, and light layout board.

A rocker power switch is found on the left rear of the unit while a small green LED at the left front indicates when the plotter is on. On a sloping surface at the right are 12 touch sensitive switches. Nine of these switches control pen position and movement: pen up and down, move to upper right or lower left, move in one of the four directions, and accelerate pen speed. PAUSE suspends plotting activity and moves the paper out to full view position; pens may be changed at this time. SELF TEST runs a test plot, and PEN DELAY causes a pen drop delay required by some commercial pens.

Four pens are furnished in one packet (black, red, blue, and green), and eight more (no duplicate colors) are in the support pack which also includes 100 sheets of smooth finish paper.

In operation, the paper moves back and forth, and the pen from side to side. Step size, distance accuracy, and repetitive accuracy are all 0.004". Default pen speed is 5.7" per second, close to the maximum of 6"/sec. For certain types of plots, a slower speed is preferable; the Sweet-P has 16 speeds from 1.4"/sec. to 6"/sec.



Sweet-P plotter from Enter Computer Inc.

Plots About Plotters, continued...

Making a Plot

As mentioned above, the Sweet-P plots points from 0 to 2500 in the X direction and from 0 to 1838 in the Y direction. Points can vary between -32,768 and +32,768 without causing errors which, in the case of plotting certain mathematical functions, simplifies the programming somewhat.

Commands are issued to the plotter in LPRINT statements. The plotter recognizes 19 commands, all of which consist of two letters; 15 require one or more arguments.

Basic plotting is done with the Draw (pen down) and Move (pen up) commands. These commands can specify an absolute x,y location or a location relative to the last pen position. A related command is Line which draws one or more lines between series of coordinates. Another related command is Point which moves the pen from its current position to a specified coordinate and makes a point mark.

Three commands control the pen: Pen Up, Pen Down, and Velocity (sets the pen speed).

The Reset command reinitializes the plotter and causes all settings to return to their default values. Home returns the pen to the home (0,0) position. Page Length sets the page length to any value between 1" and 121"; the default value is 11".

The Text command draws alphanumeric characters (numbers, letters, symbols) starting at the current pen position. The normal text delimiter (marks beginning and end of text) is a semicolon; this delimiter can be changed with the Text Delimiter command. Text can be drawn in any of 255 sizes from 0.08" high to 20.4" high and in any of the four directions (0, 90, 180, 270 degrees). We can't see too much use for very large characters, particularly since

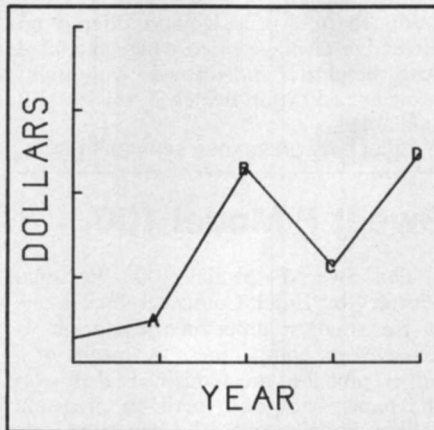


Figure 6. This graph was easily produced with an eight-line program.

they won't even fit on the paper.

The Mark command draws a specified character centered around the current pen position. This is useful to define points on a graph although, unlike many other plotters, there is no special set of graph symbols, only the standard ASCII symbols.

Two commands, Axis X and Axis Y, draw lines along the positive X or Y axis with hash marks spaced at specified intervals.

This set of commands includes several not found on other plotters; conversely, the Sweet-P lacks some commands found on other units. Most notable of the "missing" commands are those to draw circles, ellipses, and arcs; connect the points of an irregular curve; draw dashed and dotted lines; do hatching or shading; and perform automatic scaling. All of these things can be done by programming, although calculating circles and arcs can be quite cumbersome and messy.

Making up for the lack of these commands for some applications is the included disk of software (Apple or IBM PC and compatibles). This disk includes five demonstration programs, useful mainly for looking at the programming involved to produce the sample plots. Also on the disk are three graphing programs to produce line, bar, and pie charts automatically. There is also a bio-rhythm program and a tutorial which repeats the programming examples in the manual.

Documentation

The 48-page Operator's Manual is divided into nine sections, five of which consist of just a page or two. The first long section describes unpacking,



Figure 7. Sample print in size 7 (0.56" high); letters can be over 20" high.

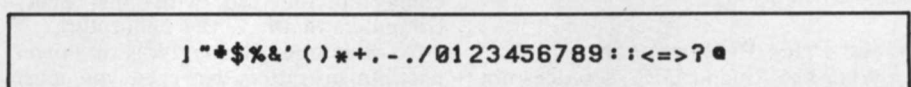
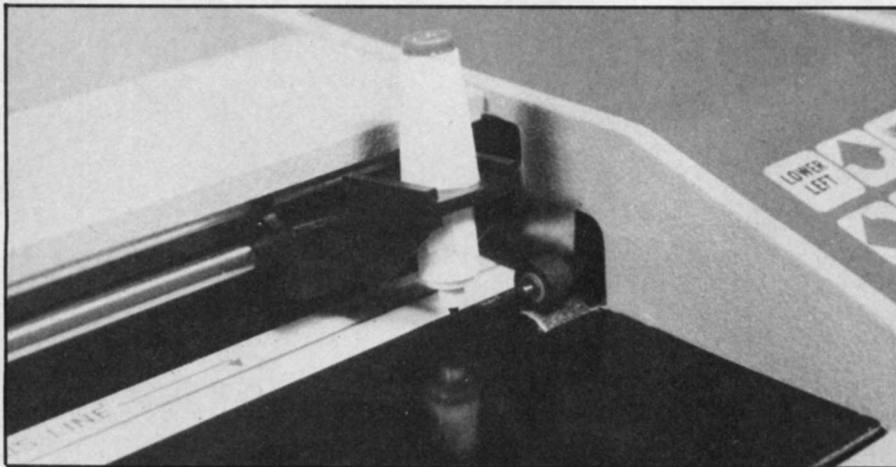
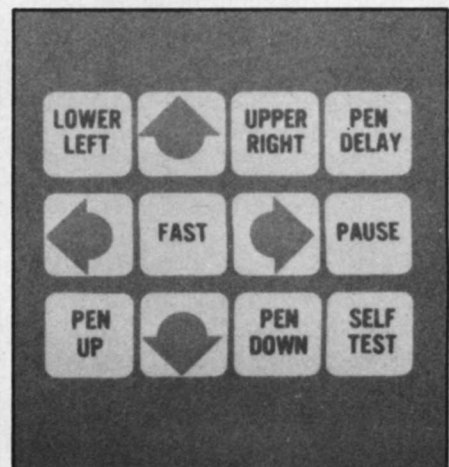


Figure 8. Numbers and symbols in character size 1 (0.08" high).



Rollers move the paper back and forth and the pen moves from side to side.



Touch panel on right has 12 plotter controls.



Integrated.

Printegrated.

Now, translate your integrated software into integrated hard copy, with the TI OMNI 800™ Model 855 printer. So versatile, it combines letter-quality print, draft-quality print and graphics as no other printer can. **It prints letter-quality twice as fast** as comparably priced daisy wheel printers, yet gives you characters just as sharp, just as clear.

It prints rough drafts ten times faster than daisy wheel printers... faster than most any other dot matrix printer. **Only the TI 855 has snap-in font modules.** Just touch a button; change your typestyle. The 855 gives you more typestyles to choose from than ordinary dot matrix printers. It makes them quicker, cleaner, easier

to access than any other dot matrix or daisy wheel printer.

The 855's pie charts are rounder... all its graphics are sharper than on other dot matrix printers, because the TI 855 prints more dots per inch. As for daisy wheel printers... no graphics.

The TI 855 Printer

The printer for all major PC's



For under \$1,000 you get twice the performance of typical dot matrix printers. Or all the performance of a daisy wheel printer, and then some, for half the price.

So get the best of all printers, and get optimum results from your integrated software. With the TI 855. See it at your nearest authorized TI dealer. Or call toll-free: 1-800-527-3500. Or write Texas Instruments Incorporated, P.O. Box 402430, Dept. DPF-182CC, Dallas, Texas 75240.

TEXAS INSTRUMENTS 
Creating useful products
and services for you.

™ OMNI 800 is a trademark of Texas Instruments Incorporated
Copyright © 1984 Texas Instruments Incorporated. 2763-36

ANNOUNCING

A LIBRARY OF SOFTWARE PROGRAMS FOR **APPLE II, II+, IIe** COMPUTERS

A+DISK

M A G A Z I N E

Now you can build a library of programs for your Apple™ at a fraction of the usual cost

Each issue of A+Disk Magazine provides you with up to 8 programs for as little as \$3.00 each.

A+ DISK MAGAZINE is making it easier than ever before to build a library of computer software for your Apple II series microcomputer. Because now you can save over \$60 on the programs you need to expand the use of your personal computer. Issue after issue, **A+DISK MAGAZINE** gives you

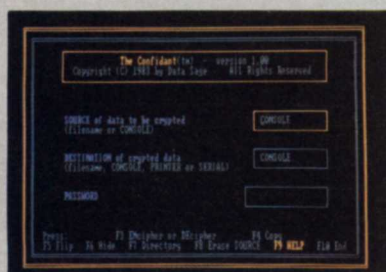
business and finance aids, utilities, subroutines, games, home and personal applications... all for as little as \$3 per program.

And when you consider that many of today's most popular programs sell for \$50, \$60, \$80 and more, your savings can be *enormous*... much more than the cost of your subscription to **A+ DISK MAGAZINE**.

Along with your subscription to **A+ DISK MAGAZINE**, you'll receive



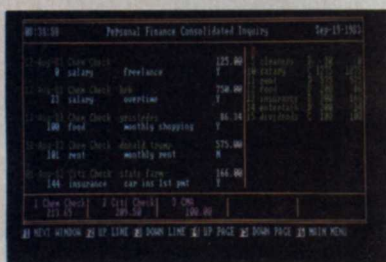
Programming tools: Create cross-reference listings for your



Business and finance aids: Compute loan payment tables. Calculate the Present Value and Internal Rate of Return for your investments. VISICALC templates for Real Estate, Lease/Purchase and Tax Shelter analysis. Create advanced pie, bar and line chart graphics.

Home/personal applications: Whether you need your own income tax return helper... a personal cash flow analyzer... a speed reading trainer... proven ways to maintain a mailing list... or SAT test preparation aids, **A+ DISK MAGAZINE** has it all.

Utilities and diagnostics:
A+ DISK MAGAZINE shows you



how to use your Apple to simulate
a conversational terminal with
control of disk or printer logging...
print graphics, screen images on
your printer... backup, copy, delete,
un-delete or type files with simple
menu commands... plus more.

Games: Adventures! Strategies!
Test your skill, intelligence and luck.



There's no need to type listings into your computer. With **A+ DISK MAGAZINE**, all you do is boot the disk and go! The accompanying User Manual explains everything in clear, easy-to-understand terms. So you'll be able to run the programs as soon as you receive your first issue of **A+ DISK MAGAZINE**.

**Subscribe to
A+Disk magazine and
save over \$60
with this
Introductory Offer!**



P.O. Box 5925
Cherry Hill, NJ 08034

YES Please accept my subscription to **A+DISK MAGAZINE** for:

<input type="checkbox"/> 1 issue for \$34.95	<input type="checkbox"/> 3 issues for \$84.	<input type="checkbox"/> 6 issues for \$149.
(Prepayment Only)	I SAVE \$20.00!	I SAVE \$60.00!

Name _____
Address _____
City _____ State _____ Zip _____

Check one: ☐ Payment enclosed* ☐ Bill me

Charge my* : ☐ American Express ☐ Visa ☐ MasterCard

Credit Card No. _____ Exp. Date _____

*10% discount for cash or credit card orders—U.S. only.

MAIL NO-RISK COUPON TODAY—AND SAVE UP TO 34%!

Canadian and foreign orders shipped via Air Printed Matter only; add \$5 per issue and include payment with order in U.S. funds.

- All programs are fully tested and guaranteed to run. Damaged or faulty disks will be replaced at no charge.
- If you wish to cancel a subscription, simply return the most recent disk in its sealed package and you will receive a full refund for this copy and all unmailed issues.

Programs will run on Apple II series computers using Apple DOS 3.3 and require a minimum of 48K. Most programs will be written in Applesoft Basic—however some machine language code may be used.

Programs and documentation are copyrighted by Ziff-Davis Publishing Company. All rights of reproduction in all forms and media strictly reserved.



8DAH278



Panasonic Printers.

We help you get it out of your system.

Panasonic can help you get the maximum performance from your computer system. The computer *has* the capabilities you need, but to get the most out of the system, a *quality* professional printer is vital.

And that's a Panasonic printer.

Look to Panasonic for a full line of printers, compatible with most popular computer systems. They feature speeds of up to 180cps, correspondence and near-letter quality, graphics capabilities, bi-directional printing with logic-seeking capabilities, proportional printing, carriages accepting paper 4" to 15" wide, cartridge ribbons, and adjustable tractor and friction feeds.

At Panasonic, we're very serious about the performance of our printers. Their reliability and our extensive

service network are a direct result of our commitment to quality. We offer a one-year limited warranty*, a nationwide regional technical support network, and a toll free number. When you use a Panasonic printer, you have an *established* high tech manufacturer behind you.

It's our business to offer you high quality peripherals—printers, computer displays, plotters, and data entry terminals. Find out how Panasonic can help you get it out of your system. Contact: Computer Products Division, Panasonic Industrial Company, Division of Matsushita Electric Corporation of America, One Panasonic Way, Secaucus, N.J. 07094. Call TOLL FREE 800-222-0584, in New Jersey (201) 348-5337.

SEE US AT NCC—LAS VEGAS SHOW BOOTH C-3588

Panasonic[®] Industrial Company

CIRCLE 153 ON READER SERVICE CARD

*1-Year Limited Warranty. (Carry-in or mail-in service.)

Atlanta, GA - (404) 925-6830; Chicago, IL - (312) 364-7900; Dallas, TX - (214) 258-6400; Cypress, CA - (714) 895-7413.

Roland and Sweet-P Plotters

	Roland DXY-101	Roland DXY-800	Sweet-P Model 100	Sweet-P Six-Shooter
Number of pens	1	8	1	6
Paper size	11 x 17"	11 x 17"	8.5 x 11"	11 x 17"
Plotting area	10.2 x 14.6"	10.2 x 13.8"	7.35 x 10"	10.2 x 16.1"
Resolution	0.004"	0.004"	0.004"	0.004"
Repetition accuracy	0.012"	0.012"	0.004"	0.008"
Different pen				
Plotting velocity (max.)	7.1"/sec.	7.1"/sec.	6"/sec.	14"/sec.
Character height	0.028"	0.028"	0.08"	0.08"
(smallest, largest)	0.441"	0.441"	20.4"	20.4"
Applications software available for	IBM PC	IBM PC	IBM PC Apple II	(from third party suppliers)
Parallel interface	Centronics	Centronics	Standard	Centronics
Serial interface	RS-232	RS-232	None	RS-232
Digitizer mode	No	No	No	Yes
Dimensions (w,d,h)	19.5 x 17 x 3"	19.5 x 17 x 3"	14 x 8.5 x 3"	18 x 11.5 x 3.2"
Price	\$750	\$995	\$795	\$1095
Manufacturer	Roland DG Corp. 7200 Dominion Circle Los Angeles, CA 90040 (213) 685-5141		Enter Computer Inc. 6867 Nancy Ridge Dr. San Diego, CA 92121 (619) 450-0601	

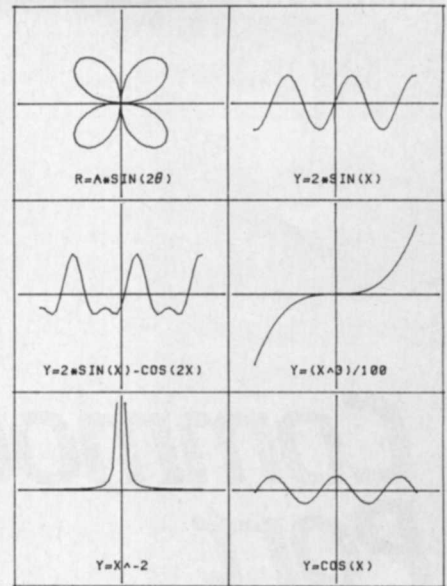


Figure 9. Demo from included software disk.

connecting, and setting up the plotter. It is well-illustrated with photos and diagrams and leaves nothing to the imagination.

A thorough description of the commands, complete with many sample programs and plots, is included in a 22-page section—one of the best we have ever seen. A similarly comprehensive section describes the contents and use of the demonstration/programming disk.

The shorter sections cover troubleshooting, maintenance, specifications, and warranty. A two-page Quick Reference Guide gives a summary of the plotter commands, conversion table

(plotter units, inches, millimeters), and default settings.

Meeting Your Needs

We feel the Sweet-P Model 100 will meet the demands of the majority of people for basic business graphics. The plotter is less suitable for mathematics and engineering applications because of the 8½" x 11" paper size and the lack of circle/arc commands. Its remarkable compactness means it can be easily carried around; it fits nicely in an attaché case.

Enhancing the suitability of the Sweet-P for business applications is the

Presentation Package, a \$90 kit which includes 25 pieces of transparency film, 25 frames, and two sets of four colored transparency pens.

In addition to the software disk included, several third party software publishers produce software that can take advantage of the Sweet-P features. Couple all of these factors with its modest \$795 price tag, and the Sweet-P Model 100 definitely goes on our recommended list.

A New Entry From Enter

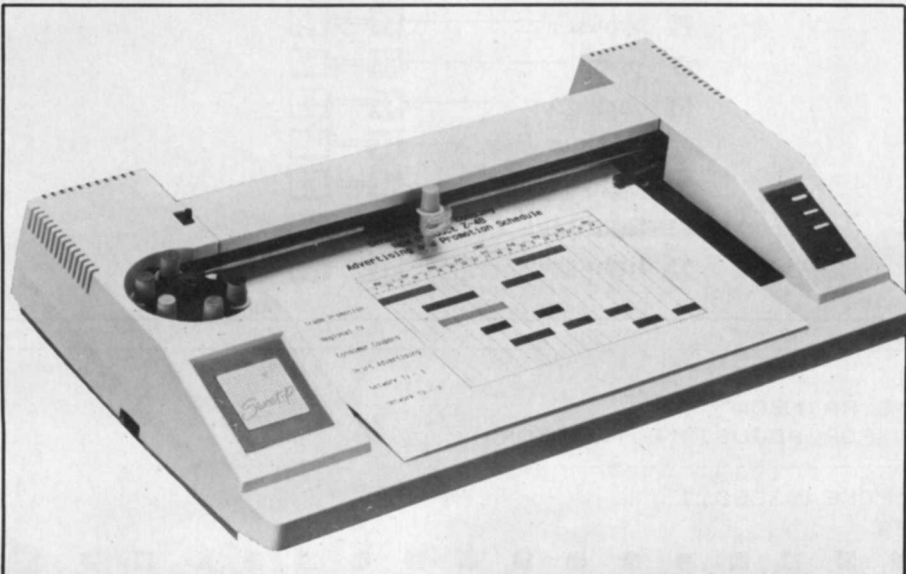
One step up from the Sweet-P Model 100 is the new Six-Shooter Model 600 plotter from Enter Computer. We did not test this plotter; however, its specifications look most impressive.

It has both parallel and serial interfaces, and a six-pen rotary penholder, and can handle 11" x 17" paper. It has an impressive list of 54 commands including ones for automatic scaling, drawing arcs and circles, shading rectangles and wedges, and selecting alternative character sets (19 of which are built in). In addition to responding to these commands (called the Sweet-P Graphics Language), the Six-Shooter also responds to the instructions for the Hewlett Packard 7470 and several other HP plotters. As a result, there should be a fair amount of third party software immediately available for this unit.

Moreover, an additional 12 commands allow the unit to be used as a digitizer. At just \$1095, the Six-Shooter certainly warrants your careful consideration.

END

CIRCLE 428 ON READER SERVICE CARD



New Six-Shooter plotter handles 11" x 17" paper and has 19 character sets built in.



Commodore's Port

John J. Anderson

Say yo ho, Commodorians. Hope you are getting the most of the early summer, and not spending every sunny, beautiful day cooped up inside. At least bring your C-64 out into the back yard or onto the fire escape. Or get a really long extension cord and bring it to the beach.

Don't take it in the water though. Computers can't swim.

I have received a batch of letters from new users telling me not to take them—beginners—for granted. Well let me tell you, I never thought I had. But I guess it must be true that some people get left behind when I move from easy stuff to tough stuff so quickly.

There is always so much to say, and so little room in which to say it.

Beginners, take heart. What follows is just for you. Warm up your machines and get ready to learn something fun.

Beginner's Rainbow

New owners of C-64s should type in the very short program that appears here as Listing 1. Figure 1 shows all the graphics characters of the program, and how to get them to appear on your computer. So typing the listing shouldn't be too hard,

Figure 1.

Character Color	Keypress
■ black	CTRL 1
□ white	CTRL 2
■ red	CTRL 3
■ medium blue	CTRL 4
■ purple	CTRL 5
■ green	CTRL 6
■ blue	CTRL 7
■ yellow	CTRL 8
■ orange	⌘ 1
■ brown	⌘ 2
■ pink	⌘ 3
■ dark grey	⌘ 4
■ medium grey	⌘ 5
■ light green	⌘ 6
■ light blue	⌘ 7
■ light grey	⌘ 8

Listing 1.

```

1 REM PROGRAM 1
2 REM BEGINNER'S RAINBOW
3 REM ALSO GOOD FOR ADJUSTING MONITOR
4 REM-----
5 POKE 53281,1:POKE 53280,1
10 FOR X=1 TO 23
20 PRINT"    ■ □ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ "
30 NEXT
    
```

Listing 2.

```

1 REM PROGRAM 2
2 REM EASY ANIMATED GRAPHICS
3 REM
4 REM-----
5 POKE 53281,0:POKE 53280,0
10 PRINT"
20 GOTO 10

```

Listing 3.

```
1 REM PROGRAM 3
2 REM ANOTHER EXAMPLE
3 REM
4 REM-----
10 PRINT" "
20 GOTO 10
```

Listing 4.

```

1 REM PROGRAM 4
2 REM YET ANOTHER EXAMPLE
3 REM
4 REM-----
10 PRINT "███████ ██████████ ██████████ ██████████ ██████████ ██████████ ██████████ ██████████ ██████████";
20 GOTO 10

```

and will give you practice typing special graphics characters.

Run the program. You get a neat rainbow test pattern in all 16 of the colors the C-64 is capable of displaying.

Now let's take a look at how the program works. Line 5 turns the entire screen, background and border, to white. Line 10 is the first part of a FOR/NEXT loop, which tells the computer it will be counting from 1 to 23.

By sticking a command or commands in between the FOR and the NEXT statements, we can make the computer execute these instructions however many times we like. Here, we have said to count from 1 to 23, and then inserted a PRINT statement between the FOR and the NEXT statements.

Pretend that you are the computer for a second and trace the program through an imaginary run. First you are told to count from 1 to 23. The first time through, X will equal one, until you see the NEXT statement, which tells you to count again.

But before you see the NEXT statement, you are told by line 20 to PRINT something. Reverse is turned on, which prints in the inverse mode, and the cursor color is switched through every possibility. So you print that line to the screen.

Then you encounter the **NEXT** statement in line 30. That says to go back to line 10 and count. This time through the

loop X will equal 2. You print line 20 again, then NEXT tells you to return to line 10 again and increase the count by one.

The process happens again and again, until the value of X reaches 23. Then the FOR/NEXT loop terminates, and the program ends.

Easiest Animated Graphics in the Universe

Big deal, right? A rainbow test pattern. Wonderful (yawn).

Aha, we have just begun. Time to pull a really neat trick out of the hat. Try this: put a semicolon after the final quote in the PRINT statement—line 20 in Listing 1. Witness the result by running the program.

Originally, each time through the loop, the program printed line 20 on a new screen line, making an ordered test pattern. By putting a semicolon in after the final quote in line 20, you command the computer to start the next print line right where the last one left off. Instead of each print line in the loop starting off on the lefthand side, they start right at the point where the last one ended. Our test pattern becomes a diagonal mosaic pattern.

By taking things one step further, we can obtain very pleasing animated abstract patterns with hardly any effort at all. Try Listing 2 on for size.

This program is very much like the one we have just examined—the print line is just the same, with the addition of the semicolon at the very end. However, the screen has now been turned totally black by line 5, and the FOR/NEXT loop has been replaced by an endless GOTO loop.

When we run the program, the color bars print continuously, until we press the RUN/STOP key. As the bars print to the bottom of the screen, the print scrolls upward. The effect is a looping cascade of color. Let's see *any* other computer do this quite so easily or in so few lines of code. That is a special advantage of your C-64's design philosophy.

You can harness the power of scrolling PRINT statements to sophisticated effect. By inserting graphics characters in RVS mode, you can create textures and patterns. The programs themselves can be very short; you can, in fact, fit them on a single program line. Listings 3 and 4 will help you get started.

Using FOR/NEXT loops, you can stack print lines in a single program to move through different patterns at whatever rate you desire. Listing 5 shows you how.

In Listing 5 each FOR/NEXT loop runs through a different pattern, then moves on to the next. These loops are enclosed within a GOTO loop, which starts everything over again. See how easy it is to nest loops? There's nothing to it.

Listing 5.

Listing 6.

Listing 7.

July 1984 © Creative Computing

INDISPENSABLE SOFTWARE

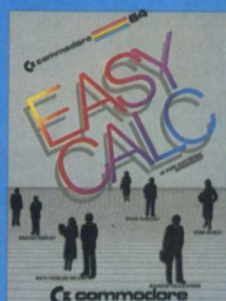
For Your Most Important Computing Needs



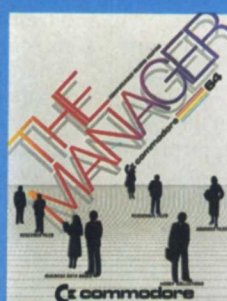
EasyScript 64
Displays 764 lines x 240 characters. Prints to 130 columns. Works with EasySpell 64.



EasySpell 64
20,000 word Master Dictionary and automatic spelling checker. Works with EasyScript 64.



EasyCalc 64
Multiple electronic spreadsheet with color bar graph feature. 63 columns x 254 rows.



The Manager
Sophisticated database system with 4 built-in applications, or design your own. Text, formulas, graphics.



SuperExpander 64
21 special commands. Combine text with high resolution graphics. Music and game sounds.



Easy Finance I—Loan Analysis
12 loan functions. Bar graph forecasting as well as calculation.



Easy Finance II—Basic Investment Analysis
16 stock investment functions. Investment bar graph.



Easy Finance III—Advanced Investment Analysis
16 capital investment functions. Bar graphs.



Easy Finance IV—Business Management
21 business management features. Bar graphs.



Easy Finance V—Statistics and Forecasting
Assess present/future sales trends with 9 statistics and forecasting functions.



Accounts Payable/Checkwriting
11 functions. Automatic billing. 50 vendors/disk.



Accounts Receivable/Billing
11 billing functions. Printed statements.



General Ledger
8 general ledger options. Custom income statement, trial balances, reports.



Inventory Management
1000 inventory items. Full reports.



Payroll
24 different payroll functions. Integrated with G/L system.

commodore
COMPUTERS

First In Quality Software

CIRCLE 106 ON READER SERVICE CARD

Commodore's Port, continued...

will devote more space to new product announcements.

MicroProse

Solo Flight from MicroProse is a flight simulator designed with fun in mind. It is easier to fly than Sublogic's *Flight Simulator*, and though its graphics are not quite as advanced as Sublogic's, it is more fun to play.

For whatever it is worth, this is the first flight simulator I have managed to land successfully in. After three dozen crashes, this was a very gratifying experience.

You are placed in the cockpit of a light plane with full instrumentation. You can practice landings and choose weather conditions—even night flight. An air mail game lets you practice at various airports under various conditions.

Look for a full review of *Solo Flight* in an upcoming games roundup.

Precision Software

Superbase 64 is a professional database management and retrieval system for the Commodore 64. It offers an unlimited number of databases, with up to 15 files per database. Each record can hold up to 1108 characters, with a maximum of 127 fields.

The system includes search and sort

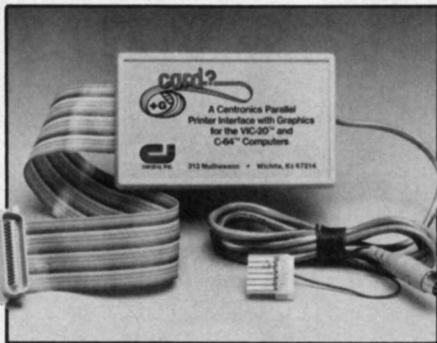
capabilities, and a user interface that is quick and easy to use, with multiple on-line help screens. *Superbase 64* handles arithmetic as well as calendar calculations. It allows the sophisticated user to create customized applications packages within the *Superbase 64* environment.

The program lists for \$100 and requires a single disk drive.

CardCo

The CardCo C/?+G printer interface has a very strange name, but does a terrific job translating from Commodore serial to Centronics parallel printer code.

The C/?+G retails for \$90 and requires no software. It includes all necessary cabling and prints the full Commodore



character set including *all* Commodore graphics characters, reversed characters, and reversed graphics characters. There are many similar interfaces on the market, but few can make that claim.

The CardCo interface works with all Epson MX, FX, and RX printers, as well as the Star Gemini and Delta-10; Prowriter; C. Itoh 8510; NEC 8023; Okidata 82, 83, 84, 92, 93, and 94; Mannesmann-Tally Spirit and MT-160; Seikosha GX-100, BMC BX-80, Gorilla Banana; and other parallel printers.

Okay, that's all for now. Catch you next time. And get some sun!

Firms Mentioned in This Column

MicroProse Software
10616 Beaver Dam Rd.
Hunt Valley, MD 21030
(301) 667-1151

Precision Software Inc.
820 Second Ave. Suite 110
New York, NY 10017
(212) 490-1825

CardCo, Inc.
313 Mathewson
Witchita, KS 67214
(316) 267-6525

Programming Utilities

THE #1 APPLESOFT PROGRAM EDITOR:

☐ **GPLE** (\$49.95)—supports DOS 3.3 and ProDOS) Global Program Line Editor lets you edit 40- & 80-column Applesoft program lines *FAST* without awkward cursor-tracing or clunky "Escape editing". FIND/REPLACE any word or variable in your programs. Define ESC plus any-key to do any task (ESC-1 can catalog disk, etc.). MOVE DOS 3.3 above main memory for an EXTRA 10K of space.

2-WAY SCROLL FOR LISTINGS & CATALOGS:

☐ **DOUBLE-TAKE** (\$34.95)—supports DOS 3.3 and ProDOS) Lets Listings & Catalogs scroll Up and Down, making file names and program lines easier to access. Fast 2-way scroll for monitor listings too.

AS="DOGFOOD" ← VARIABLE-DISPLAY prints all strings/variables with values.
X=3.14159

AS: 100 200 250 300 ← CROSS-REF shows line numbers for each variable/string.
X: 10 20 3000 3010

Also AUTO-LINE-NUMBER, better Renum/Append, Eliminate/Change Cursor, SpaceOn-Disk... And Tip Chart #1!

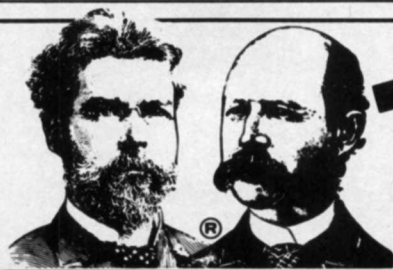
SUPER-APPLESOFT ENHANCER: (64K reqd.)

☐ **BEAGLE BASIC** (\$34.95) lets you re-name Applesoft commands to anything. For example: 10 POUR X-1 TO 3: ECRIVEZ "BONJOUR": ENSUITE Also, obsolete cassette commands (SHLOAD, etc.) are replaced by powerful new commands like ELSE, HSCRN, SWAP, TONE, SCROLL... GOTO/GOSUB a variable too.



5 LIST: LIST: LIST: LIST: LIST
6 FOR C-1 TO 40: POKE 33,C: PRINT: NEXT: GOTO 5

AD #185



Apple® Graphics

NEW! DOUBLE HI-RES GRAPHICS

☐ **BEAGLE GRAPHICS** (\$59.95) 128K required. Plot in 16 COLORS and 560x192 pixels; twice normal-resolution. New plotting program & commands draw fast hi-res circles & boxes, and FILL HI-RES SHAPES in solid or mixed colors. Easy-convert existing programs (including *Mechanic*) to Double Hi-Res. Many new tricks!

HI-RES SHAPE ANIMATION & FANCY TYPE:

☐ **APPLE MECHANIC** (\$29.50) lets you create shapes for hi-res animation. Make custom hi-res color type too. Six proportionally-spaced fonts on the disk. LIST-able demos teach how to use hi-res in your programs.
☐ **TYPEFACES** for Apple Mechanic (\$20.00) 26 additional type fonts for use with *Mechanic*'s programs.

NEW! HI-RES PICTURE-PRINTER

☐ **TRIPLE DUMP** (\$39.95) transfers any kind of screen image to your dot matrix printer, including 80-column text and Double Hi-Res graphics; cropped rotated enlarged, etc. Includes giant-letter *Banner-Maker* program.

FATCAT and More...

NEW! PERSONAL DISK LIBRARY PROGRAM:

☐ **FATCAT** (\$34.95) reads all of your DOS 3.3 and ProDOS™ Catalogs merged into one or more "Master Catalog". Search, sort, print, compare—find out what's really on all of those disks! **ALPHABETIZE FILE NAMES** on your disks too!

ALL BEAGLE BROS DISKS ARE UNPROTECTED (copyable), AND COME WITH A FREE "PEEK & POKES" CHART.

- ☐ **ALPHA PLOT** (\$39.50) 2-page hi-res drawing & typing. Move any image-section. Compress pictures to 1/3 disk space...
- ☐ **BEAGLE BAG** (\$29.50) 12 great games—the best bargain on the market. Voted to the 1983 "Most-Popular" list—*Softalk*.
- ☐ **DISKQUIK** (\$29.50) Acts like half a disk drive in Slot 3, but silent, fast, and about 1/10 the price! (requires 11e with 128K).
- ☐ **DOS BOSS** (\$24.00) Customize DOS 3.3. "Save-protect" programs with "Uncopyable" message.
- ☐ **FLEX TYPE** (\$29.50) Put variable-sized text on the same screen with normal Applesoft commands.
- ☐ **FRAME-UP** (\$29.50) Create key-controlled or unattended shows of your Apple screen images.
- ☐ **PRONTO-DOS** (\$29.50) Load/Save at 3X speed. Move DOS—extra 10K! TYPE command displays Text-file contents.
- ☐ **SILICON SALAD** (\$24.95) Many utilities. Hi-Res Program Splitter, Disk Scanner, DOS Killer... and Command Chart.
- ☐ **TIP DISK #1** (\$20.00) 100 Beagle Tip Book programs on one disk. LIST and learn. Includes Apple Command Chart.
- ☐ **UTILITY CITY** (\$29.50) 21 useful utilities; List-Formatter, Multi-Column-Catalogs, Trick Filenames... LIST and learn!

AT YOUR APPLE DEALER NOW!
Or, if you live in the Boonies, buy directly from BEAGLE BROS:



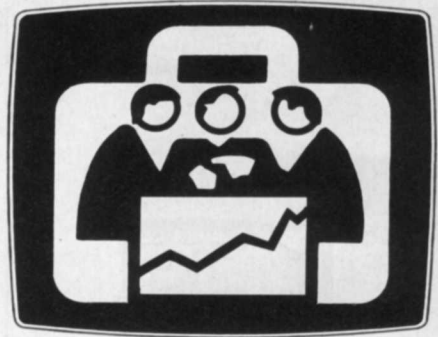
Visa, MasterCard or COD (orders only)
Phone Toll Free, All 50 states, 24-Hours:
1-800-227-3800 ext.1607
Or mail U.S. Check, Money Order or Visa/MasterCard numbers to:

BEAGLE BROS, Dept. 18
3990 OLD TOWN AVE, Suite 102C
SAN DIEGO, CALIFORNIA 92110

Add \$1.50 shipping, +6% if Calif., +\$3 if COD, +\$4 if overseas
—ALL ORDERS SHIPPED IMMEDIATELY—

CIRCLE 188 ON READER SERVICE CARD

Let's Talk Business



Last month I said I would discuss some traps to watch out for as you adopt word processing. I also said I would discuss some specific word processing programs. I think I'm really going to do it this time.

First, though, I'd like to give a little history of my involvement with word processing. As I mentioned in my April column, I became the typist for my newly formed company when my wife refused to get sucked into it. That led to the purchase of our first word processing machine, an OCI Veritext, a machine we named Vivian.

In those days, 1976, there was a slightly different vocabulary associated with word processing. There were "blind" word processors and there were those with editing screens. Vivian was a blind machine. You typed on her as you would on a typewriter, made your corrections, and when you thought you had everything the way you wanted it, you put in new paper and ran a copy. Vivian was full of surprises. Often the corrections you thought you had made in the right places were in the wrong places altogether and some very interesting sentences resulted.

We bought Vivian in April. By July we had grown enough that I decided we needed a secretary. Enter Cheryl. Cheryl was a delight to have around. She was great on the telephone; clients loved her; the other employees loved her as well; but like many who graduated from high school in the early 70s, Cheryl could not spell. In fact I often wondered if she had any grasp of the English language at all.

We used to collect Cherylisms. It has been a long time, and I can't remember many of them, but how about "toe truck"? And when a vocational coun-

Dale Blanchard

selor is writing about an intelligence test and gets back, "Mr. Jones's eye cue score was" you can bet things will be a bit disrupted for a while.

The Word Processing Trap

Between Vivian's surprises with corrections and Cheryl's spelling and Cherylisms, I fell into the first trap of word processing. I instituted proofreading. The professional staff would dictate

We had one staff member who would write a two-page report and then add another page at correction time.

their reports and letters, Cheryl would type them and give them back. The staff members would proofread them and give them back to Cheryl for more corrections. Then as a final step I would have the reports and letters routed through me for a final read.

In the beginning, when there were only two professional staff members, that was tolerable, but two things happened. First, we added more staff members, so more hours slipped down the drain. But worse than that, the professionals began to dictate in rough draft. Since they were going to have to read their reports again anyway, they stopped worrying about sentence struc-

ture and often about content. They would fix it when they proofread. We had one staff member who would write a two-page report and then add another page at correction time. Then, since he had made so many corrections, he would need to see the report again. More corrections. Cheryl hated him.

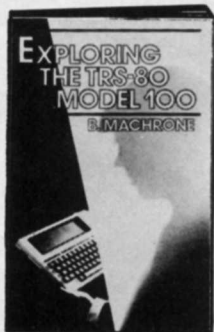
I allowed all this to happen through clever rationalization. If we let the professional staff members spend less time dictating, that would free them for more billable hours. Let's not burden these productive people with mundane details such as spelling and sentence structure. Under that theory I hired another proofreader. Mary was great; she could spell, and she knew grammar as much as anyone can know English grammar, but she hated to make decisions.

The reports we were sending were legally quite sensitive. What we said in them could obligate insurance companies to thousands of dollars of expense, or they could deprive an injured worker of years of benefits to which he was entitled. Those reports had to be right. Mary did not want to take responsibility for what was in those reports. She began to pass them on to me for final approval. So what did I have now? I had added another layer of bureaucracy. Can you believe bureaucracy in a company of six employees?

This was now our procedure:

- 1.) The staff member would dictate the report.
- 2.) Cheryl would type it.
- 3.) The staff member would proofread it and send it back to Cheryl for corrections.
- 4.) Cheryl would make the corrections.
- 5.) Depending on what the staff member had done, Cheryl would either send

**SQUEEZE MORE
LIFE OUT OF
YOUR TRS-80
MODEL 100!**



EXPLORING THE TRS-80 MODEL 100

is an outstanding supplemental guide to the Radio Shack user's manual. It offers users a technical exploration of the TRS-80 Model 100, concentrating on features not documented by the manual. You'll be introduced to many new applications and uses to this popular "lap model" machine.

This 224 page applications book covers many topics, including:

- BASIC features not documented in the user's manual
- How to use the Model 100 as a UNIX™ terminal
- How to get the most out of telecommunications software
- ADDRS as a Mini-Database manager
- Using the full power of TEXT
- And features of the Model 100 you didn't know existed!

You'll be able to "squeeze" more power and utilities out of your Model 100 with EXPLORING THE TRS-80 MODEL 100! If you use this Radio Shack model, you **need** this book!

**For faster delivery, PHONE TOLL-FREE,
9 am-5 pm E.S.T.: 1-800-631-8112
(In NJ only: 201-540-0445)**

Also available at your local bookstore and computer store. ORDER YOUR COPY TODAY!

CREATIVE COMPUTING PRESS

Dept. MC9C, 39 East Hanover Avenue
Morris Plains, New Jersey 07950

Please send me _____ copies of EXPLORING THE TRS-80 MODEL 100 at \$12.95* plus \$2.00 postage and handling (\$5.00 outside USA) each. #61-5

Payment Enclosed \$_____ *Residents of CA, NJ and NY State add applicable sales tax.

Charge My: ☐ American Express
☐ MasterCard ☐ Visa

Card No. _____ Exp. Date _____

Mr./Mrs./Ms. _____
(print full name)

Address _____ Apt. _____

City _____

State/Zip _____

☐ Please send free catalog.

Business, continued...

the report on to Mary or we would go through steps 3 and 4 again.

6.) Mary would proofread the report looking for spelling and grammar mistakes as well as sensitive content issues. Mary would send it back to Cheryl for more corrections.

7.) Cheryl would make the corrections.

8.) Depending on what Mary wanted, Cheryl would either send the report on to me, or we would go through steps 6 and 7 again.

9.) I would read the report looking for sensitive content issues and send it to Cheryl for corrections.

10.) Cheryl would make the corrections and return the report to the original staff member for signature. Heaven help us if the staff member decided to make changes at that point because if he did, that sent us right back to number 3.

We had a bureaucratic mess on our

***After a while Cheryl's
wild guesses became
just close enough that I
no longer knew
whether words were
spelled right or not.***

hands. Not only that, we were playing "Billy Goat Gruff." Remember the story your mother read you when you were little about the goats that wanted to cross the bridge? When the first billy goat got to the bridge, a troll came out and said he was going to eat the billy goat up. The little goat persuaded the troll to wait for the next billy goat who was bigger. When the next goat got there he persuaded the troll to wait for the next one and so on.

We were doing the same thing in our little company. If Cheryl didn't know how to spell a word, which happened often, she would take a wild guess at it anyway. "The person who dictated it will catch it if it's wrong," she would say to herself. The person who dictated it would look at it and say, "Mary will catch it if it's wrong." Mary would look at it and say, "Dale will catch it." And my spelling went to hell in a basket.

There was a time when I was a good speller. In the beginning, after Cheryl came on board, it wasn't too bad, but after a while Cheryl's wild guesses became just close enough that I no longer knew whether words were spelled right or not. Cheryl had wrecked my spelling.

We had meetings. "It takes less time to do it right the first time," I would say, "than to go back and fix it later."

Enter CompuServe's Electronic Mall™ and shop at your convenience in these exciting departments.

The Micro Mart
The General Store
The Travel Agent
The Book Bazaar
The Record Emporium
The Photo Booth
The Software Shop
The Financial Market
The Magazine Kiosk
The Gardening Shed
The Newsstand

A sample of the companies participating in CompuServe's Electronic Mall™ includes:

Amdek
American Airlines
American Express
AST Research
Bank of America
Bantam
Big T Automotive
Buick
CBS Publishing
CDEX
Colonial Penn
Commodore
Computer World
Digital Equipment
dillithium Press
800 Software
47th Street photo
Grolier
Harvard Business Review
Heath
Heinold Commodities
Hertz
E.F. Hutton
Inmac
Innovative Software
Knapp Press
Magazine Entree
Magazine Supply House
Manufacturer's Hanover Trust
Max Ule
McGraw-Hill
Metropolitan Life
Microsoft
Miracle Computing
Misco
Newsnet
Novation
Official Airline Guide
Pan American Electronics
Peachtree Software
Practical Peripherals
Program Store
Professional Color Labs
RCA Record Clubs
Record World
Sears
Select Information Exchange
Sim Computer Products
Simon and Schuster
Small Computer Book Club
Software Advisor
Stark Brothers
Supersoft
Vanguard
VisiCorp
Waldenbooks
Woman's Day Books
Ziff-Davis

Merchants and manufacturers who want to participate in the Electronic Mall™ may contact: Stephen A. Swanson, L.M. Berry & Co., P.O. Box 6000, Dayton, OH 45401, (513) 296-2015.



BY THE YEAR 2000, THE WORLD MAY CATCH UP WITH THE WAY COMPUSEVE'S NEW ELECTRONIC MALL™ LETS YOU SHOP TODAY.

Introducing the first computer shopping service that brings you convenience, savings and enjoyment.

Here's your chance to expand the practical uses of your personal computer.

Sign up for CompuServe and shop in our new Electronic Mall. It's easy to use. It tells you more about the products you're buying. It lets you order faster. And it's totally unique.

CompuServe's new Electronic Mall™ offers you all these shopping innovations.

– It's enormous! So it gives you in-depth information on thousands of goods and services, and lets you buy even hard-to-find merchandise. – Its unique "Feedback" service lets you ask the merchants themselves specific questions. – It's incredibly efficient in ordering the products and services you want.

– Its special discount opportunities make it economical, purchase after purchase. – And its name-brand merchants assure you of top-quality merchandise.

Make the CompuServe Electronic Mall 15-Minute Comparison Test.

What you can do in 15 minutes shopping the Electronic Mall way.

- Call up on your computer screen full descriptions of the latest in computer printers, for instance.
- Pick one and enter the order command.
- Check complete descriptions of places to stay on your next vacation.
- Pick several and request travel brochures.
- Access a department store catalog and pick out a wine rack, tools, toys... any thing!
- Place your order.

What you can do in 15 minutes shopping the old way.

- Round up the family and get in the car.

The Electronic Mall, a valuable addition to the vast world of CompuServe.

CompuServe's Consumer Information Service brings you shopping information, entertainment, personal communications and more.

You can access CompuServe with almost any computer and modem, terminal or communicating word processor.

To receive your illustrated guide to CompuServe and learn how to subscribe, call or contact...

CompuServe

Consumer Information Service
P.O. Box 20212
5000 Arlington Centre Blvd.
Columbus, OH 43220

800-848-8199

In Ohio call 614-457-0802

"Thoughtware, How Can I Become A More Effective Leader?"



Thoughtware is new, easy-to-use software that will help you see and understand how to become a better manager. It's a unique series of personal, computer-based management diagnostic and training programs.

© Thoughtware is a registered trademark of the Institute for Management Improvement.

How can you become a more effective leader? Thoughtware Program 2.1, "Leading Effectively," will tell you. This four part program has been designed to help managers improve their effectiveness as leaders. It gives you an opportunity to assess your own management style and to compare your results to the self-assessments of other managers.

Unit 1 defines leadership and discusses its three key elements—style, situation and strategy. It stresses the importance of matching the leadership style to the situation and of getting and giving feedback.

Unit 2 is designed to improve your leadership style

and increase your ability to perform more effectively. You will see the difference between the kinds of power you exert and the importance of using your influence to affect the behavior of others. You'll also learn about three factors affecting your leadership style: the assumptions you make about people, the degree to which you are task- or people-oriented, and the attitudes you have about the competence of those you supervise.

Unit 3 asks you to analyze a leadership situation you currently face in order to determine what style

of leadership is appropriate for your particular situation.

Unit 4 offers guidance on how to use eight effective leadership conditions.

To take advantage of the incredible new technology that is Thoughtware, see the adjacent column.

*Thoughtware Programs run on the following:
IBM® PC and compatibles
with color graphics card.
Apple® II Plus and IIe.*



Thoughtware®

Expanding The Universe Of Learning.

CIRCLE 177 ON READER SERVICE CARD

Thoughtware Is The Future.

It's a new way to learn, a logical and innovative approach to management training. It will revolutionize management training now, and in the future. Thoughtware utilizes the latest research in management development from leaders in the field, and has been tested nationally.

For individuals, and their organizations, the educational, economic and operational benefits of Thoughtware's computer-based learning programs are enormous. But Thoughtware isn't just the future.

Thoughtware Is The Present.

Some of the largest and most prestigious corporations and organizations in the world have purchased Thoughtware's assessing Personal Management Skills Program.

American Express	Ingersoll-Rand
American Mgt. Assoc.	IRS
Apple Computer	Johns Hopkins Univ.
AT&T	Levi Strauss
Avon	Marriott
Bankers Life	Marsh & McLennan
Blue Cross &	Mass. Mutual
Blue Shield	McGraw-Hill
Bank of Boston	MCI
Bureau of the Census	U.S. Navy
Chevron USA	NCR
Ciba-Geigy	NYU
Citibank	Owens-Illinois
City of Dallas	Owens-Corning
Crown Zellerbach	Fiberglas
Dow Jones	Royal Cup Coffee
Dun & Bradstreet	Sentry Insurance
DuPont	Singapore Embassy
Ernst & Whinney	Stone & Webster
Exxon	St. Regis Paper
Federal Reserve Bank	Tampax
Fireman's Fund	The Nestle Co.
General Electric	The Rouse Co.
General Foods	3M Corporation
Georgia-Pacific	TRW
Gov't of Canada	Univ. of Illinois
Gulf Oil Corporation	United Parcel Service
Hewlett Packard	United Way
Horn & Hardart	Univ. of Mass.
Hughes Aircraft Co.	Westmoreland Coal
Husky Oil	Westinghouse Corp.
IBM	Xerox

And hundreds more. What they've learned, you can now discover.

You can reap the benefits of Thoughtware by visiting your local computer dealer, or call us at our toll-free number 1-800-THT-WARE, or write:

Thoughtware Inc.
Dept. M, 2699 So. Bayshore Dr.
Coconut Grove, Florida 33133.

Thoughtware Programs include:

1.1 Assessing Personal Management Skills (\$350)

2.3 Defining Goals And Objectives (\$450)

2.6 Managing Time Effectively (\$450)

Business, continued...

"You saw that on a poster," they countered. They were right, I had seen it on a poster.

We had more meetings. "You know how companies without word processing handle their reports?" I asked. "They just dictate them and send them," I said, answering my own question. "The person who dictates the report never sees it again. The secretary types it, signs the dictator's name to it and sends it out. That's all there is to it."

"But our reputation is that we have the best reports in the business," they countered.

"Yes," I answered, "and that's how we'll be remembered. 'That company had beautiful reports; I wonder why they went bankrupt.'"

Some Word Processing Programs

Eventually Vivian, our blind, dedicated word processor, couldn't keep up and was retired to the back room. There is a story there that I may tell someday, but I have promised to talk about some specific word processing programs, and I will.

At the time we bought Vivian almost all word processors were hard wired. That is, the word processing program was built into the machine. Even back then when I knew next to nothing about computers, I knew that concept was wrong. What if someone comes up with a better idea? There is no way to get it into the machine.

Enter Lanier. I was reading a word processing newsletter one day and came across a paragraph which said Lanier Business Systems had announced a word processor with the program on a floppy disk. I looked up their number in the phone book and the next day a salesman was in my office. A week later I was the proud owner of a Lanier No Problem word processor. I hadn't thought of it before, but do you suppose there was a time when computer companies didn't announce products until they actually had them? If we were to re-enact that scene today, I wouldn't get my machine for at least six months, maybe a year.

As the No Problem came, it had only two programs, one to repaginate (it took me a while to figure out what that word meant) and a list/merge program. There were other programs in the works and as they became available, I would get a chance to see them.

Although the technology of that machine is several years old, the word processing program which came with it is still the one I hold up for all other programs to be compared against. It had on-screen underlining. It had a very good delete function with which you could define what you were going to de-

lete and that which you had designated for alphabet heaven was highlighted on the screen. Its move function did the same thing. But the main thing I liked about it was that what you saw on the screen was what you got on the paper. Also you could print either from the screen or from a disk file.

Its main drawback was that it was a page-oriented program as opposed to a document-oriented program. You got only 99 lines on a page, and then you had to store that on disk and start the next page. That made it cumbersome to go back and review what was on previous pages. That 99-line limitation was in part a function of limited memory. In those days memory was expensive and most computers had only 32K of RAM. The Lanier No Problem was a 32K machine and both the program and the document you were working on had to be in memory at the same time. To get around these shortcomings the Lanier would repaginate, that is, take your original document and break it up into pages of the length you wanted.

In 1980 I decided that the world was being taken over by computers and if I wanted to in any sense be in control of my life I had best learn more about them. I bought an Intertec Superbrain. Based on much research, I also bought *Wordstar* from MicroPro.

After using the very friendly Lanier program I hated *Wordstar*. I didn't get on-screen underlining. I had to learn arcane control sequences to do things for which the Lanier gave me dedicated keys. Two of these were named SCREEN and DELETE. If I want to delete something I pressed SCREEN DELETE and then defined what I wanted to delete. I could delete a word, a paragraph, several paragraphs or remainder. If I wanted to delete something which didn't meet any of those definitions I could press SCREEN DELETE and then hold down a cursor key until what I wanted to take out was highlighted. Then I pressed EXECUTE.

In *Wordstar* I could delete only characters, words, or lines unless I wanted to put block markers at the beginning and end of what I was going to delete. Even then I didn't get to see it highlighted. I later learned that was the fault of the Superbrain, not *Wordstar*.

Moving text on the Lanier was much like deleting it. I could define what I wanted to move, and as I did so, it became highlighted on the screen. In *Wordstar* I again had to put block markers at the beginning and end of what I wanted to move.

There were two other features of the Lanier which I resented losing in *Wordstar*. First, on the Lanier my margins, tab settings, and character and line

TIMEX SINCLAIR TRIPLE PLAY!

MORE PROGRAMS. MORE GAMES. MORE PRACTICAL APPLICATIONS.

That's what you can get from your Timex Sinclair with these 3 new books from Creative Computing Press.



1 50 Programs for the Timex Sinclair 1000

Exciting games, graphics, math, physics and business applications make your unexpanded TS 1000 more versatile than you ever thought possible. Easy-to-follow instructions let you immediately type in and run each carefully-tested program. Features excellent user-friendly feedback, improved screen display and graphic quality. A great way to expand your computer capability and add to your software library. Go for it! Softcover, 5 1/2" x 8 3/4", 15T, \$6.95. (\$1.50)

2 Creative Games for the Timex Sinclair 2068

A complete guide to the TS 2068 color computer, *Creative Games* allows you to enjoy your computer while learning to use it more effectively. Contains 21 number games, word games, simulation games, dice games, card games and grid games. Each one accompanied by clear instructions for entry and play, plus an explanation of how the game was written. You learn everything from how to set up your machine and make entries to how to create your own original games. Order yours today! Softcover, 5 1/2" x 8 3/4", 2T \$7.95. (\$2.00)

3 The Timex Sinclair 1000 Ideabook

Discover your TS 1000's hidden strengths—and overcome its weaknesses—so you can get more out of it every time you use it. Written in easy-to-understand language, the *Ideabook* includes 50 ready-to-run programs that can help you solve practical problems in math, science and business. Ten informative chapters cover repetitive trial, convergence, recursion, compounding, probability, geometry, science, simulations, drill and practice. Send for it now! Softcover, 5 1/2" x 8 3/4", 3P, \$8.95. (\$2.00)

**Use this coupon
to order your
Timex Sinclair
books today.**

For even faster service,
**PHONE TOLL FREE:
800-631-8112**
(In NJ: 201-540-0445)

Also available at your
local bookstore or
computer store.

Creative Computing Press

Dept. ME2F • 39 East Hanover Avenue • Morris Plains, NJ 07950

Please send me:

	Book No.	Quantity	Price Each	P&H Each	Total Price
50 Programs for the TS 1000	15T		\$6.95		
Creative Games for the TS 2068	2T		\$7.95		
The TS 1000 Ideabook	3P		\$8.95		

CA, NJ and NY State residents add applicable sales tax

Postage and handling charge appear in
parentheses () next to price of book.

TOTAL AMOUNT

\$

☐ Payment enclosed. \$ (Outside USA add \$3 per order.)

☐ Charge my: (Charge and phone orders \$10 minimum.)

☐ American Express ☐ MasterCard ☐ Visa

Card No. _____ Exp. Date _____

Signature _____

Mr./Mrs./Ms. _____
(please print full name)

Address _____ Apt. _____

City/State/Zip _____

☐ Send me a FREE Creative Computing Catalog.

00000

Business, continued...

spacing were all stored invisibly with my documents. In *Wordstar* when the program was loaded I got its default values. Since those rarely matched what I wanted, I had to reset my own values each time I worked on a document.

But by far the biggest loss in the switch from the Lanier to *Wordstar* was that I lost my on-screen math capabilities. The Lanier had a truly elegant program, which in its final form was known as Mathmaster. You could type columns of figures and then right there do math calculations on them. For example, you could type a column of figures, put your cursor on the top number of the column, press SCREEN A C (screen add column), and instantly you had the total of the column. If you wanted the total put at the bottom of the column, you pushed T and the total was printed on the screen right where it belonged. With this same program I could also multiply, divide, and do percentages. *Wordstar* had nothing even remotely resembling that capability.

Lanier has gone through many changes since those good old days and I have lost track of what they are doing. I know they have some new machines out with new programs and I suspect they are very competently handled. I suppose I should try to find out so that, if for no other reason, I can write intelligently about them.

My adventures with *Wordstar* have continued, and most of my early objections have been overcome, both through improvements in *Wordstar* and through improvements in my own knowledge. For example, one of the main reasons the Lanier program was easier to use than *Wordstar* was that it had dedicated function keys. Most computers now have function keys which can be assigned to specific *Wordstar* functions, which makes the program much more friendly. It still doesn't have on-screen underlining, still doesn't invisibly store my formatting information with my documents, and still doesn't provide the math capabilities that my Lanier had. In spite of that I do use *Wordstar* for much of what I do.

But I don't use it for writing this column. Instead I use *Spellbinder* from Lexisoft. I suspect I am safe in saying that *Wordstar* and *Spellbinder* are among the best known, if not the two best known, word processing programs on the market. I think they are both very good programs, with each having some advantages over the other. The bottom line of why I use *Spellbinder* for writing this column is that I can print from the screen. I like to do a final proofread as the pages come off the printer. If I find something I want to change, I can do it on the spot, reprint the page and go on

from there. *Wordstar* is a bit more cumbersome.

The tradeoff is that I have to print from the screen. In *Wordstar* I had to print from the file, but at the same time I could be working on something new on the screen. For me that is not a real advantage, because I have never been either organized enough or smart enough to split my attention between two tasks.

Well, I see that I have done it again; run out of space before I have run out of

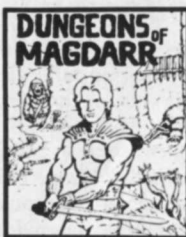
words. However, as promised, I really did talk about a couple of word processing programs. Your Honor, I would like it noted in the record that I did talk about some word processing programs.

Next Month

Next month I'll try to do a little more comparison of *Wordstar* and *Spellbinder*. Then I want to talk about *Catalog* from SRX. If I have space, I'll try to get to *Mite* from Mycroft.

AARDVARK LTD.

VIDEO ADVENTURES™



DUNGEONS OF MAGDARR - Serious D of D for up to 8 players. Features full 3d GRAPHICS! You get a choice of several characters that grow from game to game and are interchangeable with characters from our famous Dungeons of Death game. A real dungeon with level after level of monsters to conquer and treasures to find - all in hi-res 3d graphics.

Available On: TRS80C, IBM PC, CMDB4
TAPE \$19.95 DISK \$24.95



QUEST - A different kind of Graphic Adventure. It is played on a computer generated map of Alesia. You'll have to build an army and feed them through combat, bargaining, exploration of ruins and temples, and outright banditry! Takes 2 - 5 hours to play and is different each time.

Available On: TRS80C, IBM PC, CMDB4, VICE 13K, MC10 10K, 1000 EXT. BASIC, IBMPC
TAPE \$14.95 DISK \$18.95



MARS - Your ship crashed on the Red Planet and you have to get home. You will have to explore a Martian City, repair your ship, and deal with possibly hostile aliens to get home again. This is recommended as a first Adventure. It is in no way simple - playing time normally runs from 30 to 50 hours, but it lets you try out Adventuring before you battle the really tough ones. Full Graphics Adventure.

Available On: TRS80C, CMDB4, IBM PC
TAPE \$19.95 DISK \$24.95

BAG-IT-MAN - The ultimate arcade game for TRS80C or CMDB4. This one has three screens full of BAGS OF GOLD, CARTS & ELEVATORS TO RIDE IN, MINE SHAFTS, and TWO NASTY GUARDS. Great sound and color and continuous excitement.

Available On: TRS80C, IBM PC, CMDB4
TAPE \$19.95 DISK \$24.95



STARFIRE - If you enjoyed Star Raiders or Star Wars, you will love Starfire. It is not a copy, but the best shoot-em-up, see them in the window space game on the CMDB4 or TRS80C. The fantastic graphics will put you right in the control room as you hyperspace from quadrant to quadrant fighting the aliens and protecting your bases.

Available On: TRS80C, IBM PC, CMDB4
TAPE \$19.95 DISK \$24.95



PYRAMID - ONE OF THE TOUGHEST ADVENTURES. Average time through the pyramid is 50 - 70 hours. Clues are everywhere and some ingenious problems make this popular around the world. FULL GRAPHIC ADVENTURE.

Available On: TRS80C, IBM PC, CMDB4, MC10 10K, IBM PC
TAPE \$19.95 DISK \$24.95



NEW! GRAPHIC ADVENTURES

AARDVARK offers over 120 original high quality programs. Send one dollar for a current catalog and receive a \$1.00 gift certificate good towards your next purchase.

Authors - AARDVARK pays top dollar for high quality programs. Send a copy today for a personal review and editorial help.

TO ORDER: Send amount indicated plus \$2.00 shipping, per order. Include quantity desired and your preference of tape or disk. Be sure to indicate type of system and amount of memory. When using charge card to order by mail, be sure to include expiration date.



CHARGE CARDS
WELCOME



1-313-669-3110

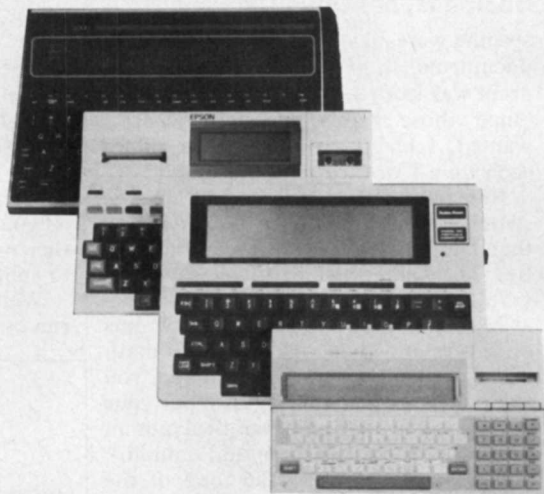
PHONE ORDERS ACCEPTED
8:00 a.m. to 8:00 p.m. E.S.T., MON-FRI

AARDVARK Action Software

2352 S. COMMERCE • WALLED LAKE, MI 48088 • (313) 669-3110

CIRCLE 101 ON READER SERVICE CARD

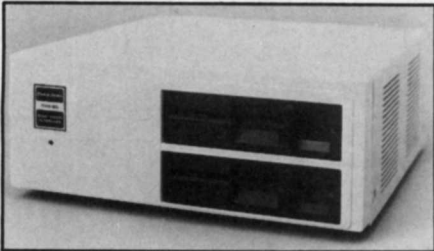
Notebook Computing



It is a pleasure to man the portable column once again. I'd be lost without my Radio Shack Model 100 and can barely remember what life was like B.N.C. (before notebook computer). Model 100 owners may take a moment out to rejoice: this month's entire column will be devoted to that most popular of portable computers. The Model 100 has sold more than 100,000 units, and continues to be one of Radio Shack's most popular machines.

Finally, Disk/Video for the 100

Yes, after a rather massive wait, Radio Shack has actually unrolled the 3806 Disk/Video Interface for the Model 100. At



Radio Shack 3806 Disk/Video Interface.

\$800, it provides a 40- or 80-column video signal, as well as a 184K half-height 5¼" disk drive. This may seem a bit pricey, and it is. But for those in dire need of mass storage and without download access to another computer, it is an overdue godsend. The ability to bypass the LCD for a video display makes the Model 100 faster and easier to work with. We will present a complete evaluation of the Disk/Video Interface in an upcoming column.

Model 100 Book Beat

It has taken six months or so for the microcomputer industry to catch up with

John Anderson

the needs of the burgeoning portable field. Now, at last, valuable books for the Model 100 owner have begun to surface. Here is a roster of the best I have seen so far:

- *The TRS-80 Model 100 Portable Computer* by David A. Lien. 555 pp. Compusoft Publishing, P.O. Box 19669, San Diego, CA 92119. \$19.95. The acknowledged master of TRS-80 legerdemain sets his sights on the Model 100. Lien wrote the original light-hearted manual for the TRS-80 Model 1, which got me excited about computers way back in 1978. He has a light, amusing, but highly focused style, and an uncanny ability to impart complex concepts painlessly. Profusely illustrated, thoroughly indexed, and chock full of meaty programming examples. To my mind a bookshelf must for Model 100 owners.

- *The Model 100 Book: A Guide to Portable Computing* by Jonathan Erickson and Robert J. Sayre. 310 pp. Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710. \$14.95. An excellent companion for Lien's book, this work explains in plain language the types of benefits the Model 100 can provide and backs up its suggestions with solid Basic code. Uses a chatty, informal style to outline use of the Model 100 in the home, office, and classroom. Right on the beam in its section about using the computer on the road, and includes neat programs like a foreign language dictionary and currency conversion. Also includes valuable information on telecommunications potential of the machine.

- *The TRS-80 Model 100 Ideabook* by David H. Ahl. 141 pp. Creative Computing

Press, 39 East Hanover Ave., Morris Plains, NJ 07950. \$8.95. Banish the thought—I did not include this entry because my boss told me so. I included it rather because it contains 50 classic programs ready-to-run on the Model 100. These include problem-solving, drill and practice, function-plotting, probability, geometry, science, and of course, games. The classics, Lunar Lander and Hammurabi, are there, in all their glory, but formatted for the LCD. And nothing can teach you Basic quicker than learning how these simple programs run. My early interest in micros

The ability to bypass the LCD for a video display makes the Model 100 faster and easier to work with.

is attributable directly to Messrs. Ahl and Lien.

- *The Model 100 Companion* by the Editors of Osborne/McGraw-Hill. 116 pp. Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710. \$14.95. A collection of 27 programs including applications, entertainment, and utilities. Games include a nice music maker and the classic Towers of Hanoi puzzle. Utilities include a Basic renumber program, listing format program, and a really neat program called Invisible System, which removes the filenames of the ROM-based software from listing in the Menu program. As a result, you can add five extra filenames of your own.



Please judge this book by its cover.

Everything you need to know about MICROSYSTEMS is right there on the cover. It is, pure and simple, *The Journal for Advanced Microcomputing*. A professional resource that takes you far beyond the basics of most computer magazines.

MICROSYSTEMS is for *sophisticated* users and designers who need straightforward, no-frills input on advanced microcomputer programming and technology. People who create their own systems for important business, personal, scientific and educational applications.

Whether you use CP/M®, MP/M®, MS-DOS™, UNIX®, XENIX™, or OASIS—MICROSYSTEMS will provide you with a monthly package of expert tutorials on valuable modifications and special uses. The field's leading authorities will show you how to upgrade. Download. Modify. Debug. Interface. Patch. Speed up. Short cut. Customize.

You'll get more power, more versatility, more performance from your DOS for every information processing job. For example, here's the type of *high-level guidance* you can expect in the months ahead:

- How to access the wealth of free software available from Remote CP/Ms
- HP-GL: Add graphics to any computer system
- More WordStar mods for the Z-19
- Twenty-seven 16-bit DOS compared
- Reviews of four C compilers: BDS C, Small C, tiny c TWO™ and Whitesmiths C

**Save up to 31% on
THE JOURNAL FOR
ADVANCED
MICROCOMPUTING!**

- 488 Bus Tutorial: What the IEEE-488 GPIB bus does and how to use it
- Interfacing the Epson MX-80 printer via a parallel port
- Will solid-state drives replace the hard disk?
- Review of CompuPro's MPX-1 Multiplexer Channel

And there's more. Regular departments include industry news and insider's reports... The S-100 Bus... The Unix File... In the Public Domain... Book Reviews... New Products... plus the Software Directory, detailing newly available programs.

How high-level is MICROSYSTEMS? If you use computers in your profession, the cost of your subscription may be *tax-deductible*. And if you act now—while this New-Subscribers-Only offer is in effect—you can save up to 31%!

MICROSYSTEMS. When it comes to customizing software and adapting hardware, no one covers the field better.

Microsystems

P.O. Box 2930 Boulder, CO 80322

YES—Please enter my subscription to MICROSYSTEMS immediately at the NEW-SUBSCRIBERS-ONLY rate I've checked below:

- ☐ One year (12 issues) only \$21.97—I save 19%!
☐ Two years only \$40.97—I save 24%!
☐ Three years only \$55.97—I save 31%!

(Savings based on full one-year subscription price of \$26.97.)

Check one:

- ☐ Payment enclosed
☐ Bill me later

Charge my:

- ☐ MasterCard
☐ Visa
☐ American Express

Mr./Mrs./Ms. _____ (please print full name)

MS8H690

Company _____

Address _____

City _____

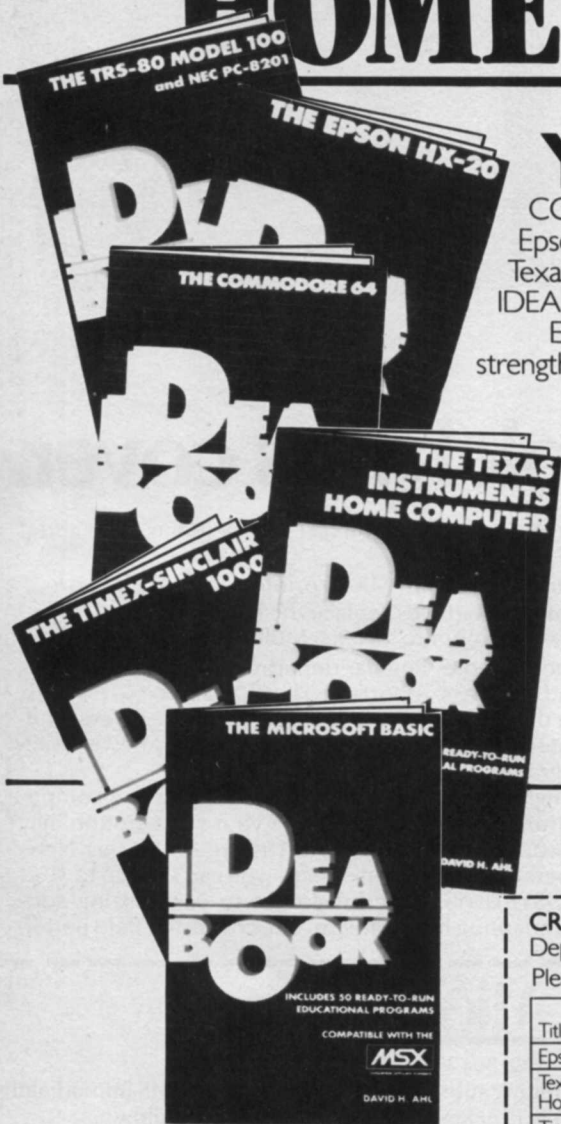
State _____

Zip _____

Card No. _____ Exp. Date _____

Add \$5 a year in Canada, all other foreign add \$8. Please allow 30 to 60 days for delivery of first issue.

HARNESS THE FULL POTENTIAL OF YOUR HOME COMPUTER



**ONLY
\$8.95
EACH**

You can increase your knowledge and harness all the power your home computer system has to offer with CREATIVE COMPUTING PRESS' IDEABOOKS. If you're an owner of an Epson HX-20, TS 1000, TRS-80 Model 100, Commodore 64, Texas Instruments or work with Microsoft Basic, you'll find an IDEABOOK written for you!

Each IDEABOOK helps you discover your computer's hidden strengths and overcome its weaknesses! As soon as you open to chapter one, you'll begin to get more out of your system with:

- 50 tested, ready-to-run programs that will help you solve everyday problems in math, science and business.
- Problem solving formulas with repetitive trials, convergence, recursion, compounding, probability, simulations, geometry, science and drill and practice.
- Ways to identify any shortcomings and targeted applications that are best suited for your system.

Supplement your user manual with the IDEABOOK that's just right for you! Gain the knowledge and confidence you need to make the most of your system—ORDER YOUR COPY TODAY!

For faster delivery, PHONE TOLL FREE

9 am–5 pm E.S.T.: 1-800-631-8112 (In NJ only: 201-540-0445)

Also available at your local bookstore or computer store.

CREATIVE COMPUTING PRESS

Dept. MD8F, 39 East Hanover Avenue, Morris Plains, NJ 07950

Please send me the following books:

Title	Book No.	Qty.	Price Each	\$2.00 Postage & Handling Each	Total Price
Epson HX-20 Ed.	3S		\$8.95		
Texas Instruments Home Computer Ed.	3R		\$8.95		
Timex-Sinclair 1000 Ed.	3P		\$8.95		
TRS-80 Model 100 Ed.	4A		\$8.95		
Microsoft Basic Ed.	67-4		\$8.95		
Commodore 64 Ed.	68-2		\$8.95		
CA, NJ and NY State residents add applicable sales tax					
Total Amount Due					

Payment Enclosed \$ _____ Outside USA add \$3.00 per order.

Purchase orders \$50 minimum.

Charge My: ☐ American Express ☐ Visa ☐ Mastercard

Card No. _____ Exp. Date _____

Mr./Ms./Mrs. _____ (print full name)

Address _____

City/State/Zip _____

☐ Please send me a Free Creative Computing Press Catalog.

Notebook Computing, continued...

You can still enter Basic, Text, Telcom, Addrss, and Schedl—by typing the name of the ROM-based program you want, and hitting ENTER—very handy.

The book also gives detailed instructions for downloading programs from Compu-serve. The utilities are very useful and excellently annotated. Beginning Model 100 owners will certainly want to check out this book.

Book Beat Doggie

It is my unfortunate duty to warn you off *All About Hand-Held and Briefcase-Portable Computers* by C. Louis Hohenstein. 368 pp. Byte Books, McGraw-Hill Paperbacks, 1221 Avenue of the Americas, New York, NY 10020. \$9.95.

The book needlessly and unproductively blurs the line between handheld and portable computers, and provides a nearly worthless overview that helps neither the portable owner nor the portable shopper. Its highly uneven approach explains things like keyboards as if we had never seen one before, then later on provides an exploded view of the Sharp PC-1500—not to study the architecture, but more or less just for the hell of it.

A quote: "In the hand-held computers we're using as examples, the visual display is usually located above the keyboard, near the top of the computer faceplate." Things deteriorate from there. With a straight face the author compares the \$7000 Grid Compass with the \$70 TRS-80 PC-1.

Generally a mess. McGraw-Hill ought to know better, but then again, nobody's perfect. In any case, stay away from this one. It's a major doggie.

Model 100 Microcassette Fix

In the November 1983 issue of *Creative Computing*, Glenn Hart gave a favorable review to the Olympus C100 Microcassette Recorder. He noted in his review that the supposedly "portable" cassette recorders used by some portable computer owners as storage devices were heavier and bulkier than the portables themselves. He was extremely impressed by the C100, which at 5.4" by 2.6" by 1.1" is smaller than a pack of cigarettes. It is one of a growing number of microcassette dictation

NAME BRAND PRODUCTS DISCOUNT PRICES

CALL FOR YOUR BEST PRICES ON THESE POPULAR BRAND NAMES:

EQUIPMENT



PRINTERS



CALL FOR NEW PRODUCTS
AND BEST PRICES

MicroManagement
Systems, Inc.

2803 Thomasville Road East
Cairo, Georgia 31728
(912) 377-7120

FREE UPON REQUEST
• DISCOUNT PRICE LIST AND INFORMATION KIT

1-800-841-0860
CONVENIENT ORDER ENTRY

CIRCLE 146 ON READER SERVICE CARD



600XL CALL
800XL CALL

DISK DRIVES
Indus GT Call
Trak AT-D2 \$388
Trak AT-1 \$319
Trak AT-D4 Call
Astra 1620 (Dual) \$499
Percom Call
Atari 1050 \$349
Rana 1000 Call

INTERFACES
Axiom 846 Call
Ape Face Call
Atari 850 (In Stock) \$169
Interfast 1 \$150
Microbits 1150 Call
Axiom Buffer Call

MEMORIES
Microbits 64K (XL) \$126
Intec 48K (400) \$89
Mosaic 48K (400) \$98
Intec 64K (400) \$105
Mosaic 64K (400/800) Call
Mosaic 32K \$68
Atari 64K (600XL) Call

DIRECT PRINTERS
Axiom AT-100 \$219
Atari 1027 \$285
Axiom 550 AT \$319
Axiom 700 AT \$469
Atari 1025 \$395

DIRECT MODEMS
Microbits 1000C \$128
Atari 1030 \$114

OTHER ATARI
400 Keyboard Call
Koala Pad \$67
Chalkboard Pad \$75
Bit-3 80 Column \$228

ATR-8000 (64K) \$448
ATR-8000 (16K) \$295
Allen Voice Box \$98
1010 Recorder \$74

Printers

STAR
Gemini 10X \$268
Gemini 15X \$398
Delta 10 \$378
Star Letter Qual. Call

EPSON
FX80 Call
MX100 Call
RX 80 F/T Call

SMITH CORONA
TP II \$438

JUKI
Wico Joystick \$21
Wico Trackball \$36
Compuserve \$26
Covers \$7

CITOH
Prowriter \$335
Prowriter II \$648
Starwriter \$1098
Printmaster \$1448

OKIDATA
82A Call
84P Call
92 Call
93 Call

MANNESMANN
160L \$588
Spirit Call

Maxells \$25
Memorex \$24
Elephants \$18
Flip 'N File \$20

COSMIC COMPUTERS
727 BREA CANYON RD., SUITE 16
WALNUT, CA 91789

(800) 626-7642
(714) 594-5204
IN CALIF.

Add \$2.50 shipping per software order in continental U.S. Add \$5.00 shipping per software order for AK, HI, FPO-APO. MasterCard and Visa OK for software only within continental U.S., add 3% surcharge. All defective returns must have a return authorization number.

COMMODORE

DISK DRIVES
MSD (170K) \$349
MSD (Dual) (170Kx2) \$539
Laser (170K) \$325
Commodore 1541 \$239
Concord (170K) Call

80 COLUMN BDS
Batteries 80 Col \$138
Video Pak 80 \$129
Z80 Video Pak \$209

RECORDERS
Cardco Recorder \$48
1530 Commodore Call
Cassette Interface \$29

INTERFACES
The Connection \$85
Bus Card \$138
Cardco G+ \$69
Cardco B Call
MSD (IEEE) \$98
MSD 5 Slot \$48
RS-232 Call

DIRECT PRINTERS
MPS 801 \$219
Commodore 1526 \$288
Cardco LQ/II \$498
1520 Color Printer \$129

DIRECT MODEMS
Hesmodem \$53
1650 Autodem \$99
1600 Modem Call

MIRAGE CONCEPTS
Data Base (D) \$68
Word Processor (D) \$68

PROFESSIONAL SW
Wordpro W/Spell (D) \$68
Spellright (D) \$45

QUIKTEX
Quick Br. Fox (R) \$49

MISCELLANEOUS
Diskey (D) \$33
Barrons Sat (D) \$59
Millionaire (D) \$39
Sargon II (D) \$23
B-Graph (D) \$59
Castle Wolfenstein (D) \$20

BATTERIES INCLUDED
Paper Clip (D) \$69
Consultant (D) \$75
Bus Card \$138
80 Column BD \$138
Paper Clip w/Spell (D) \$85
Spell Pack (D) \$37
Organizer Series (Ea) \$22

BLUE SKY
Calc Result Adv. \$99
Calc Result Easy \$57

CONTINENTAL S.W.
Home Accountant (D) \$48
Tax Advantage (D) \$39
FCM (D) \$34

Lyc Computer Marketing & Consultants

TO ORDER
CALL US

TOLL FREE 800-233-8760
In PA 1-717-327-1824

DISK DRIVES

RANA

1000 ... \$ CALL

PERCOM

ATARI AT88-PD\$329.00
AT-88 DOUBLER\$129.00
ADD-ON DRIVES.....\$ CALL

HARD	FOR	5 MEG
DISK	APPLE	10 MEG
DRIVES	IBM-PC	15 MEG
AVAILABLE		20 MEG

TRAK DISK DRIVES

AT-D1\$379.00
AT-D2\$399.00
AT-D2 TURBO PAK\$22.95
PRINTER CABLE\$22.95

CONCORD DISK DRIVES

APPLE 163K DRIVE\$199.00
APPLE 326K DRIVE\$229.00
APPLE CONTROLLER CARD.....\$69.00

COMMODORE VIC 174K.....\$289.00
COMMODORE VIC 348K.....\$359.00

ATARI 176K MASTER.....\$289.00
ATARI 348K MASTER.....\$369.00
ATARI ADD-ON DRIVES.....\$CALL

DATASOFT
POOYAN C/D\$21.75
O'RILEYS MINE\$21.75
PARKER 20
FROGGER\$33.75

PROFESSIONAL SOFTWARE
WORD PRO 3\$59.75
SPELL RIGHT\$39.75
BOTH TOGETHER\$59.75

EASTERN HOUSE
RABBIT 20 ROM\$34.75
RABBIT 64 ROM\$34.75

KOALA

KOALA TABLET\$84.75
PROGRAMMERS GUIDE.....\$12.75
GEOMETRIC DESIGNS.....\$22.75
LOGO DESIGN\$27.75
ILLUSTRATOR\$99.75
SONG WRITER D\$27.75
MASTER TYPE\$27.75

CONTINENTAL

HOME ACCOUNT D\$44.75
TAX ADVANTAGE\$35.75
BOOK OF APPLE
SOFTWARE\$16.95
GENERAL LEDGER\$179.95
ACCOUNTS PAY\$179.95
ACCOUNTS REC\$179.95
PAYROLL\$179.95
PROPERTY MGMT\$329.95

CP/M VERSION

PEACHPACK 4\$295.00
ACCTS PAYABLE III.....\$549.00
ACCTS PAYABLE IV.....\$899.00
ACCTS REC III\$549.00
ACCTS REC IV\$899.00
GENERAL LEDGER III.....\$549.00
GENERAL LEDGER IV.....\$899.00
INVENTORY MGMT I.....\$549.00
INVENTORY MGMT II.....\$899.00
PAYROLL III\$549.00
PAYROLL IV\$899.00
SALES INVOICING I\$549.00
SALES INVOICING\$899.00

DISKETTES ELEPHANT

SINGLE SIDE SD (10)\$17.75
SD (100)\$16.75/10
SINGLE SIDE DD (10)\$21.75
DD (100)\$20.75/10
DOUBLE SIDE DD (10)\$26.75
DD (100)\$24.75/10

MAXELL

MD1 (10)\$27.75
MD2 (10)\$37.75

CERTRON CASSETTES

CC-10 (12)\$15.99
CC-20 (12)\$17.99

INNOVATIVE CONCEPTS

DISK STORAGE (10)\$4.95
DISK STORAGE (15)\$9.95
DISK STORAGE (25)\$19.95
DISK STORAGE (50)\$26.75
ROM STORAGE (10)\$24.75

MODEMS

ANCHOR MARK I\$45.75
ANCHOR MARK II\$79.75
HAYES SMART\$239.00
HAYES MICRO II\$309.00
MICROBIT 1000C\$129.00
CAT\$144.00
D-CAT\$155.00
J-CAT\$115.00
APPLE CAT II\$279.00
212 APPLE CAT\$589.00

INFOCOM

DEADLINE\$34.75
ZORK 1.2. or 3\$34.75
ENCHANTER\$34.75
PLANETFALL\$34.75

SPINNAKER

KINDERCOMP D\$21.75
STORY MACH D\$23.75
FACE MAKER D\$23.75
SNOOPER TR D\$29.75
SNOOPER T2 D\$29.75
DELTA DRAW D\$32.75
FRACTION F D\$23.75
ALPHABET ZOO D\$21.75
MOST AMAZING D\$26.75
RHYMES & RID D\$21.75

APPLE DUMPLING GX.....\$99.75
APPLE DUMPLING
16K BUFFER\$179.75
TEXT PRINTER
INTERFACE\$79.75

ATARI

INFOCOM

DEADLINE\$34.75
ZORK 1.2. or 3\$26.75
ENCHANTER\$34.75

EDUFUN

GULP ARROW
GRAPHICS\$24.75
FACE FLASH\$24.75

CONTINENTAL

HOME ACCOUNT D\$44.75
TAX ADVANTAGE\$35.75
BOOK OF ATARI
SOFTWARE\$16.95

COMPUTER CARE

BIB

DISK DRIVE CLEANER\$12.75
COMPUTER CARE KIT\$19.75

NORTRONICS

DISK DRIVE CLEANER
WITH SOFTWARE FOR
IBM-PC, ATARI, VIC,
APPLE, & TI\$29.75
DISK CLEANER REFILLS.....\$14.75
CASS DRIVE CLEANER.....\$9.95
MEDIA BULK ERASER\$46.75

MONITORS

SAKATA COLOR\$249.00
TAXAN GREEN\$119.00
TAXAN AMBER\$129.00
TAXAN RGB
COMPOSITE\$289.00
ZENITH AMBER\$105.00
ZENITH GREEN\$95.00
GORILLA GREEN\$88.00
GORILLA AMBER\$95.00
NEC JB1260\$99.00
NEC JB1205\$145.00
NEC JB1215 COLOR\$269.00
AMDEK GREEN\$145.00
AMDEK AMBER\$149.00
AMDEK COLOR 1\$289.00

SSI

KNIGHTS OF DESERT\$26.75
EAGLES\$26.75
TIGERS IN SNOW\$26.75
GERMANY 1985\$36.75
BATTLE FOR
NORMANDY\$26.75
SHATTERED ALLIANCE.....\$39.75

SIERRA ON-LINE

ULTIMA II\$39.75
DARK CRYSTAL\$27.75

ATARISOFT

PACMAN\$25.75
DONKEY KONG\$25.75
DIG DUG\$25.75
CENTIPEDE\$25.75
ROBOTRON\$25.75
PROGRAM DESIGN
ANALOGIES\$18.50
PREP FOR SAT'S\$79.75
PRESCHOOL IQ
BUILDER\$18.75
READING COMP\$18.75
VOCABULARY BUILDER.....\$18.75

SCARBOROUGH

SONG WRITER D\$27.75
MASTER TYPE\$27.75

EASTERN HOUSE

MONKEY WRENCH II\$52.75
DON'T ASK SOFTWARE

SAM\$39.75
ABUSE\$22.75
WORD RACE\$24.75

PROGRAM DESIGN

ANALOGIES\$14.50
PREP FOR SAT'S\$79.75
PRESCHOOL IQ
BUILDER\$16.75
READING COMP\$16.75
VOCABULARY BUILDER.....\$16.75
LET'S SPELL\$14.75



VIC 64\$ CALL
VIC 1541\$239.00

SSI

KNIGHTS OF DESERT\$26.75
EAGLES\$26.75
TIGERS IN SNOW\$26.75
COMBAT LEADER\$26.75
BATTLE FOR N\$26.75
EPYX 64

JUMPMAN C/D\$27.75
JUMPMAN JR R\$27.75
PITSTOP R\$27.75
TEMPLE ASPHAI\$27.75
GATE T ASPHAI\$27.75
CRUSH, C&C C/D\$21.75
INFOCOM 64

ENCHANTER\$34.75
PLANETFALL\$34.75



BRODERBUND

BANK STREET D\$44.75
CHOPLIFTER D\$24.95
DAVID'D MAGIC\$24.95
DROL D\$24.95
LODE RUN D\$24.95
SEAFOX D\$22.95
SPARE CHANGE D\$24.95
AE D\$24.75

PEACHTREE SOFTWARE

LIST MANAGER\$199.00
BUSINESS GRAPHICS\$225.00
GRAPHICS LANGUAGE.....\$299.00

REQUIRES COBAL RUNTIME

ACCTS PAYABLE I\$495.00
ACCTS PAYABLE II\$1695.00
PAYROLL I\$495.00
PAYROLL II\$1695.00
GENERAL LEDGER I\$495.00
GENERAL LEDGER II\$1695.00



TO ORDER



CALL TOLL FREE
800-233-8760
In PA 1-717-327-1824
or send order to
Lyc Computer
P.O. Box 5088
Jersey Shore, PA 17740

Lyc0 Computer Marketing & Consultants

TO ORDER
CALL US

TOLL FREE 800-233-8760
In PA 1 717-327-1824

MANNESMANN TALLY

SPIRIT 80\$299.00
MTL-160L\$559.00
MTL-180L\$775.00

NEC

NEC8023\$369.00
NEC8025\$699.00

PRINTER INTERFACING

AVAILABLE FOR COMMODORE
VIC, APPLE, ATARI, IBM-PC,
TRS-80, TI, AND OTHERS

STAR

MICRONTICS

GEMINI 10X\$259.00
GEMINI 15X\$379.00
DELTA 10\$449.00
DELTA 15\$525.00
RADIX 10\$575.00
RADIX 15\$675.00
POWERTYPESCALL
SWEET P (Model 100)\$549.00
STX80\$149.00

SMITH CORONA TP2\$449.00

SAVE ON THESE IN-STOCK PRINTERS

CITOH

GORILLA GX-100\$169.00
GORILLA SERIAL\$199.00
PROWRITER 8510\$335.00
PROWRITER II\$575.00
8600\$899.00
STARWRITER\$999.00
PRINTMASTER\$1299.00
SHEET FEEDER\$425.00
620\$929.00
630\$1699.00
8510 SP\$499.00
8510 SCP\$559.00
A10 LETTER QUAL\$499.00

EPSON

RX-80SCALL
RX-80 FTSFOR
FX-80SCURRENT
FX-100SPRICES

OKIDATA

80SSAVE
82ASON THESE
83ASIN-STOCK
84SPRINTERS
92SCALL &
93SSAVES

PRINTING PAPER

3000 SHEETS
FANFOLD\$42.75
1000 SHEETS
FANFOLD\$19.75
1000 SHEETS LETTER\$21.95
200 SHEETS LETTER\$8.99
150 RAG STATIONERY\$10.99
MAILING LABELS (1 in)\$9.75
14x11 1000 FANFOLD\$24.75

WICO

COMMODORE & ATARI

JOYSTICK\$16.75
RED BALL\$18.75
BOSS JOYSTICK\$12.75
TRACK BALL\$32.75
12 FT EXT CORD\$6.95
TI ADAPTER\$9.95
APPLE ANALOG\$34.75
IBM-PC ANALOG\$34.75

CONTINENTAL 64

HOME ACCOUNT D\$44.75
TAX ADVANTAGE\$35.75
F.C.M.\$35.75
64 USERS OF ENCYC\$12.75
20 ENCYCLOPEDIA\$12.75
KOALA 64
KOALA TABLET\$69.75
PROGRAMMERSGUIDE\$12.75
GEOMETRIC DESIGNS\$22.75
LOGO DESIGN\$27.75
SPIDER EATER\$22.75



CARDCO

G PRINTER
INTERFACE\$64.75
B PRINTER
INTERFACE\$39.75
KEY PAD 64\$29.75
LIGHT PEN\$29.75
3 SLOT EXPANSION\$24.75
5 SLOT EXPANSION\$54.75
6 SLOT EXPANSION\$79.75
PRINTER UTILITY\$19.75
CASSETTE INTERFACE\$29.75
WRITE NOW 20\$29.75
WRITE NOW 64\$39.75
MAIL NOW\$29.75
DM-1 PRINTER\$109.75
LO-1 PRINTER\$499.75

BRODERBUND 64

BANK STREET D\$44.75
CHOPLIFTER R\$29.95
DAVID D MAGIC\$24.95
DROL D/R\$24.95
LODE RUN D/R\$24.95
SEAFOX R\$29.95
SPARE CHANGE D\$24.95

DUST COVERS

800\$3.99
400\$3.99
1200\$3.99
410\$3.99
810\$3.99
600 XL\$5.99
800XL\$5.99
1050\$5.99
1010\$5.99
PROWRITER\$5.99
GEMINI 10X\$5.99
PERCOM\$5.99
EPSON\$5.99
RANA\$5.99
VIC 64/20\$5.99
VIC 1541\$5.99

TIMEWORKS

INVENTORY\$39.75
ACCOUNTS REC.\$39.75
ACCOUNTS PAY\$39.75
GENERAL LEDGER\$39.75
PAYROLL\$39.75
INVENTORY MAN\$39.75
CASH FLOW\$39.75
SALES ANALYSIS\$39.75
DATA MANAGER\$19.75
MONEY MGR C/D\$19.95
CHECKBOOK C/D\$19.95
FORGET-ME-NOT\$19.95
STAR BATTLE\$19.95
ROBOT REVOLT\$19.95
SPELLBOUND C/D\$19.95

HES 64

TURTLE TUTOR\$22.75
TURTLE TRAINER\$22.75
TURTLE GRAPHICS\$37.75
SOUND BOX\$9.95
64 FORTH\$39.95
HESMON\$22.75
GRIDRUNNER\$19.75
ATTACK OF MC\$22.75
HESWRITER\$28.75
OMNI WRITER\$45.75
TYPE N WRITER\$24.75
PAINT BRUSH\$22.75
BENJI\$25.75
HOME MANAGER\$28.75
TIME MONEY MGR\$44.75
OMNI CALC\$33.75
SWORD POINT\$19.95
HES MODEM\$49.95
M. MULTIPLAN\$65.75

SYNAPSE 64

BLUE MAX C/D\$24.75
ZEPPELIN C/D\$24.75
PHAROAH'S C/D\$24.75
SHAMUS C/D\$24.75

PARKER 64

FROGGER\$32.75
QBERT\$32.75
TUTANKHAM\$32.75

SPINNAKER 64

KINDERCOMP D/R\$21.75
STORY MACH ROM\$24.75
FACE MAKER D/R\$24.75
SNOOPER TR D\$26.75
SNOOPER T2 D\$26.75
DELTA DRAW ROM\$26.75
FRACTION F ROM\$24.75
KIDS ON KEYS\$24.75
ALPHABET ZOO\$24.75
MOST AMAZING R\$26.75

RESTON 64

MINER 2049 ROM\$29.75

ADVENTURE INTERNATIONAL

ADVENTURE 1-12 ea.\$17.75
SAGA\$27.75
PREPIE\$24.75
DISKEY\$34.75
SEA DRAGON\$24.75

KOALA TABLET\$69.75
PROGRAMMERSG\$12.75
GEOMETRIC DESIGN\$22.75
LOGO DESIGN\$27.75
ILLUSTRATOR\$99.75

INHOME
400 KEYBOARD, SIN-STOCK
BIT 3

80 COLUMN SCREEN
BOARD\$259.75

PARKER

FROGGER\$32.75
QBERT\$32.75

SPINNAKER

KINDERCOMP D/R\$20.75
STORY MACH D/R\$26.75

BRODERBUND

BANK STREET D\$44.75
CHOPLIFTER D\$32.95
DAVID D MAGIC\$24.95
DROL D\$24.95
LODE RUN D\$24.95
SEAFOX D\$22.95
SPARE CHANGE D\$24.95
AE D\$24.75

EPYX

JUMPMAN C/D\$27.75
JUMPMAN JR R\$27.75
PITSTOP R\$27.75
TEMPLE ASPHAI\$27.75
GATE T ASPHAI\$27.75
CRUSH, C&C D/D\$21.75
LJK
LETTER PERFECT\$69.75
DATA PERFECT\$69.75
SPELL PERFECT\$69.75

PACMAN

DONKEY KONG\$29.75
DIG DUG\$29.75
CENTIPEDE\$29.75
STAR RAIDERS\$32.75
ROBOTRON\$32.75
PAINT\$32.75
JOUST\$35.75
LOGO\$69.75
ATARI WRITER\$79.75
BOOK KEEPERS\$104.75
VISICALC\$159.75
HOME FILING MGR\$35.75
PILOT HOME\$54.75
KEYPAD\$95.75



PERCOM

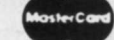
AT88S1 ..\$249.00

RDF40SI \$269.00

DATASOFT

KNIGHTS OF DESERT\$26.75
EAGLES\$26.75
TIGERS IN SNOW\$26.75
COMBAT LEADER\$26.75
SPELL WIZZARD\$34.75
TEXT WIZZARD\$34.75
WORD WIZZARD\$46.75
ZAXXON C/D\$26.75

GEMINI 10\$259.00



TO ORDER



or send order to

Lyc0 Computer
P O Box 5088

800-233-8760

Customer Service 1-717-327-1825 Jersey Shore PA 1774C

CIRCLE 143 ON READER SERVICE CARD

POLICY

In-stock items shipped within 24 hours of order. Personal checks require four weeks clearance before shipping. No deposit on C O D orders. Free shipping on prepaid cash orders within the continental U S. PA residents add sales tax. All products subject to availability and price change. Advertised prices show 4% discount offered for cash, add 4% for Master Card or Visa. DEALER INQUIRIES INVITED.

800XL\$ CALL
1050 DISK DRIVE \$ CALL
1050 RECORDER \$74.00
1027 PRINTER SCALL
1025 PRINTER IN-STOCK

Computer MAGAZINE PROGRAMS TYPED AND MAILED ON DISK

FROM **\$8²⁵** PER
ONLY MONTH
Including disk and postage.

We type for:
C64 * ATARI * APPLE

We are a typing service. Price includes all the programs from 3 top magazines for your computer. Programs are typed, run tested, and mailed to you on disk as soon as possible each month.

**AMTYPE
CORPORATION**

7 days toll free
1 (800) 521-3200

CIRCLE 105 ON READER SERVICE CARD

Software That Works For Generations

6 Types of Charts and Sheets
Indices
User Fields
Notes, Footnotes and Sources
No Limits
Adapts to Your Hardware
Comprehensive
Easy to Use
And Much, Much More

Send for brochure and sample printouts.

Family Roots includes detailed manual and 2 full diskettes of programs for your Apple II, IBM PC, Commodore 64 and CP/M.*

Other genealogy software also available.

Price \$185. Satisfaction Guaranteed.

American Express, Visa & Mastercard Accepted

* Trademarks for
Apple Computer,
Inc., International



Business Machines,
CBM, Inc., & Digital
Research.

QUINSEPT, INC.

P.O. Box 216, Lexington, MA 02173
(617) 862-0404

CIRCLE 161 ON READER SERVICE CARD

Notebook Computing, continued...



Olympus C100 Microcassette.

recorders that can meet the demands of data storage.

When it came to the Model 100, however, the C100 did not perform well. Hart concluded that the 1500 baud transfer rate proved too much for the Olympus recorder and left it at that. He went on to recommend the recorder highly for TRS-80 PC-1 and PC-2 owners, as well as owners of equivalent Sharp handhelds.

Well it is time for an update and a clarification. The reason the C100 proved incompatible with the Model 100 was not a matter of baud rate. The reason for the incompatibility of the C100 and many other recorders with the same problem, is the lack of an AUX input jack. When Model 100 input—designed to go into an auxiliary jack—is routed instead to a MIC input jack, the signal becomes badly distorted from overload. It will not load properly. The fact that Glenn Hart got any programs to load to the Model 100 is amazing and a tribute to his patience.

Peter Cronin, of Montvale, NJ, wrote with a fix that will allow the C100 and many other recorders to work with the Model 100.

The solution, confirmed by several members of the Model 100 Special Interest Group (SIG) on Compuserve, is the addition of a simple attenuator circuit between the input lead and the MIC input jack on the recorder. The adaptor is as

simple as a 3.3K ohm resistor attached in a series with a .01 MFD capacitor on the signal (hot) input lead. Attach a 390 ohm resistor to the braided (ground) lead (see Figure 1). Cronin gives the following hints about assembly:

"The components can be installed in a short 'extension cord' for the wire going into the MIC input and must be shielded in accordance with good electronic practice. It is also a good idea to keep the recorder a foot or so away from the computer. Many Model 100 owners are successfully using this adaptor with a variety of cassette and microcassette recorders."

Thanks for the under \$5 fix, Peter, and keep in touch.

For \$125, the C100 is thus transformed into an extremely compact and reliable Model 100 storage peripheral. Olympus offers a special microcassette tape especially for data storage, 15 minutes long, and retailing for \$2.20. For more information contact Olympus, 4 Nevada Dr., Lake Success, NY 11042. (516) 488-3880.

Let the Machine Demo Itself

Whenever I pull out the Model 100 on a plane, at a news conference, or during an interview, people ask questions about it. When I hand it to them, they stare at the screen and say "wow," but that's about it. I took the time to write a short demo, that lets the Model 100 tell about itself instead of making me do it. It can do a much better job, anyway.

Listing 1 is a version of that demo. It struts a bit of graphics and sound, as well as listing the important features of the machine. It hints at the kinds of powers the machine commands, and at the same time keeps the whole thing light. It takes up about 3K.

Novice programmers can learn a little bit from this listing. The random line and box displays (lines 150-270) are very simple graphics demos and could be improved with very little work. The sound demo (lines 350-390) is bare bones, but shows how easy it is to get the Model 100 to play a little tune. Lines 410 to 460 comprise a self-portrait, and are easily transportable to other programs.

You might also explore the use of PRINT AT commands to place the cursor on the screen. Simplicity itself—and the effect is quite nice.

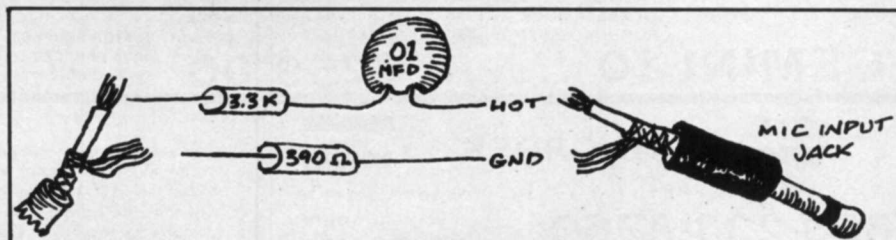


Figure 1.

Notebook Computing, continued...

Listing 1.

```

10 'Model 100 Demo Program
20 'by John Anderson
30 '2/12/84 Creative Computing
40 '-----
110 CLS:PRINT:PRINT" The TRS-80 Model
100:":GOSUB 2000
120 PRINT:PRINT" The first truly
practical portable...":GOSUB 2000
130 PRINT:PRINT " And a computer to be
reckoned with!":GOSUB 2000
140 FOR A=1 TO 60:SOUND 6000,1:SOUND
8000,1:NEXT A
150 CLS:FOR E=1 TO 25
160 A=INT(RND(1)*238)
170 B=INT(RND(1)*62)
180 C=INT(RND(1)*238)
190 D=INT(RND(1)*62)
200 LINE (A,B)-(C,D)
210 NEXT E:CLS
220 FOR E=1 TO 15
230 A=INT(RND(1)*238)
240 B=INT(RND(1)*62)
250 C=INT(RND(1)*238)
260 D=INT(RND(1)*62)
270 LINE (A,B)-(C,D),1,B
280 NEXT:CLS:PRINT"Dear Jerry,":GOSUB
2000:PRINT:PRINT" It was good
meeting with you last"
290 PRINT"Thursday.":GOSUB 2000:PRINT"
I'm sure that InfoCo":PRINT"will be a
great success. Best of luck."
300 GOSUB 2000:PRINT:PRINT"
Sincerely,"
310 GOSUB
2000:PRINT@5,"Bernard,":PRINT@144,"Warth
og Inc."
320 GOSUB 2000:PRINT@5,"Rodney,
":PRINT@144,"Zwicky Bros."
330 GOSUB
2000:PRINT@5,"Juanita,":PRINT@144,"Squea
ko Ltd.":
335 GOSUB
2000:PRINT@5,"Herbert,":PRINT@144,"Syntr
onics Co.":GOSUB 2000:GOSUB 2010
340 CLS:PRINT:PRINT:PRINT:PRINT" It can
even play music!"
350 READ A:IF A<0 THEN 400
360 SOUND A,9
370 GOTO 1250
380 DATA
12538,9394,8368,7456,7456,8368,7032,7456
,11172,12538,7456,9394,8368,11172,12538,
9952,9394
390 DATA
6269,6269,7032,7456,8368,7456,8368,9394,
9952,11172,12538,11172,9952,9394,9952,93
94,8368,7456,8368,9394,-999
400 CLS
410 LINE (20,20)-(90,60),1,B
420 LINE (26,24)-(77,34),1,BF
430 LINE (80,25)-(84,31),1,BF
440 LINE (23,40)-(87,54),1,BF
450 LINE (29,56)-(77,58),1,BF

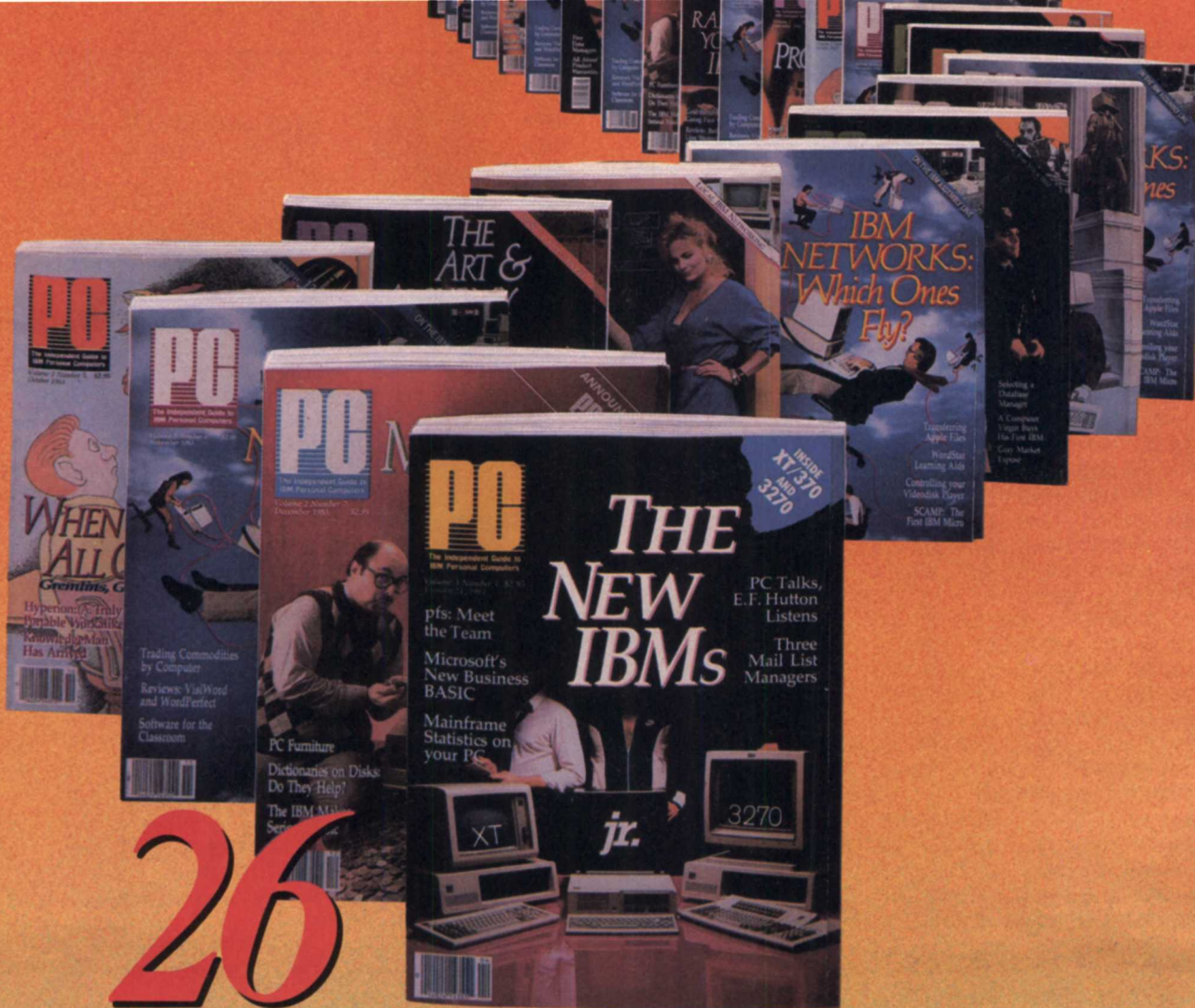
```

```

460 LINE (23,37)-(87,38),1,BF
480 LINE (170,5)-(230,35),1,B
490 PRINT@110,"cassette"
500 LINE (100,10)-(160,60),1,B
510 PRINT@179,"printer"
520 LINE (25,20)-(25,7),1:LINE
(25,7)-(170,7),1
530
LINE (31,20)-(31,12),1:LINE (31,12)-(100,1
2),1
540 PRINT@245,"Model 100"
550 GOSUB 2000:GOSUB 2000
560 CLS:PRINT:PRINT" *** Full-stroke
keyboard":GOSUB2000:PRINT:PRINT" ***
Built-in modem and phone dialer":GOSUB
2000
570 PRINT:PRINT" *** ROM software
packages":GOSUB 2000:GOSUB 2000
580 PRINT@ 227,"Text editing":GOSUB 2000
585 PRINT@ 227,"Terminal ":GOSUB 2000
590 PRINT@ 227,"Address File":GOSUB 2000
600 PRINT@ 227,"Scheduler ":GOSUB 2000
610 PRINT@227,"Basic ":GOSUB 2000
620 CLS:PRINT:PRINT" *** Bar code reader
jack":GOSUB 2000:PRINT:PRINT" *** Eight
programmable-function keys":GOSUB 2000
630 PRINT:PRINT" *** Non-volatile CMOS
RAM user memory":GOSUB 2000:GOSUB
2000:GOSUB 2010
640 CLS:PRINT:PRINT" *** Built-in
calendar and clock":GOSUB
2000:PRINT:PRINT" *** Low battery
drain":GOSUB 2000
650 PRINT:PRINT" *** RS-232 port for
communication":GOSUB 2000:GOSUB
2000:GOSUB 2010
660 CLS:PRINT:PRINT:PRINT" Ask the
person who is":PRINT" showing it to
you":PRINT" to tell you more!":GOSUB
2000
1000 MENU
2000 FOR A=1 TO 1000:NEXT A:RETURN
2010 FOR A=1 TO 300:NEXT A:RETURN
2020 LINE (6,55)-(234,55),1:RETURN

```





REASONS TO SUBSCRIBE TO



Your subscription will bring you 26 big issues every year of the most up-to-date facts and technological breakthroughs that affect you and your IBM or compatible personal computer. 26 big issues of *PC* delivered to your door AT UNBELIEVABLE SAVINGS!

Every other week you'll get a library of professional insights including latest coverage of newly-released hardware and peripherals. You'll find timely information on innovations in programming, applications and networking. You'll communicate with professionals and users like yourself and get reviews of new software packages, some before they even hit the shelves.

You can subscribe to *PC*, The Independent Guide To IBM Personal Computers for as little as \$1.02 an issue! Use the attached card or the coupon at right TO SUBSCRIBE TODAY!

GET THE MOST UP-TO-DATE INFORMATION FOR YOU AND YOUR PC WITH *PC*, 26 TIMES A YEAR!

26

SUBSCRIBE TO

P.O. BOX 2443 • BOULDER, CO 80322

2

YES, Please enter my subscription to *PC* for:

☐ 26 issues (one year) for only \$29.97...LESS THAN \$1.16 A COPY!

☐ 52 issues for only \$52.97...LESS THAN \$1.02 A COPY!

Full one-year subscription price \$34.97. Single copy price \$2.50.

Mr./Mrs./Ms. _____ please print name in full 8H039

Company _____

Address _____

City _____ State _____ Zip _____

Check one: ☐ Payment enclosed ☐ Bill me later

Charge my: ☐ American Express ☐ Visa ☐ MasterCard

Card No. _____ Exp. Date _____

Add \$52 a year for postage to Canada and all other foreign countries. Please allow 30 to 60 days for delivery of first issue.

Notebook Computing, continued...

Listing 2.

```

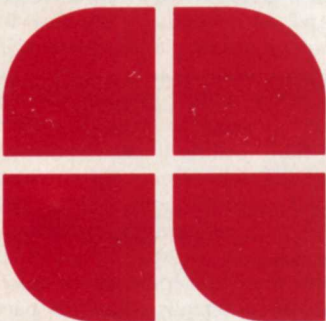
10 'Word Counter Program
20 'by John J. Anderson
30 '3/5/84 Creative Computing
40 '-----
100 CLEAR 5000:W=0
110 CLS:PRINT:FILES
120 PRINT:INPUT "File name (must be .DO
file)";N$
130 CLS:PRINT:PRINT"An exact count takes
a lot of time.":PRINT"An approximate
count is quicker.":PRINTSTRING$(39,"-")
150 PRINT:PRINT"(E)xact or (A)pproximate
count:"
160 I$=INKEY$
170 IF I$="e" THEN 300
180 IF I$="a" THEN 250
190 GOTO 160
250 ON ERROR GOTO 500:OPEN N$ FOR INPUT
AS
1:CLS:PRINT:PRINT"Working...":PRINTSTRIN
G$(39,"-")
255 IF EOF(1) THEN 270
260 INPUT #1,A$:W=W+15:GOTO 255
270 CLOSE 1:BEEP:PRINT"File (" N$;" )
contains approximately":PRINT:PRINT"
";W;"words.":

```

```

280 PRINT:PRINT"<M> for menu, <SPACEBAR>
to rerun.";
290 I$=INKEY$:IF I$="m" THEN MENU
295 IF I$=" " THEN RUN
297 GOTO 290
300 ON ERROR GOTO
500:CLS:PRINT:PRINT"Working...":PRINTSTR
ING$(39,"-"):OPEN N$ FOR INPUT AS 1:W=1
310 A$=INPUT$(1,1):Z$=Z$+A$:N=N+1
320 IF N>3 THEN Z$=RIGHT$(Z$,3)
330 IF EOF(1) THEN 380
340 IF A$=CHR$(10) THEN W=W+1
350 IF LEFT$(Z$,1)<>CHR$(32) AND
MID$(Z$,2,1)=CHR$(32) AND
RIGHT$(Z$,1)<>CHR$(32) THEN W=W+1
360 PRINT @213,W;
370 GOTO 310
380 CLOSE 1:BEEP:PRINT@ 120,"File
(" N$;" ) contains
exactly":PRINT@219,"words."
390 PRINT:PRINT"<M> for menu, <SPACEBAR>
to rerun.";
400 I$=INKEY$:IF I$="m" THEN MENU
410 IF I$=" " THEN RUN
420 GOTO 400
500 CLS:PRINT:PRINT:PRINT:PRINT"
IMPROPER FILE NAME:":FOR X=1 TO
1000:NEXT X:RESUME 110

```



GenTech

COMPUTERS

ALTOS All Models	\$Call
COLUMBIA	
1600-1 (128K, 2 Drives)	\$Call
1600-VP (Portable, 2 Drives)	\$Call



COMPUPRO All Models	\$Call
CORONA Desktop & Portable PC's	\$Call
EAGLE PC-Plus 2 /PC-Plus XL	\$Call
Spirit-2 /Spirit-XL	\$2995/\$Call
FRANKLIN	
CX Series (Apple DOS, MS-DOS, CP/M)	\$Call
ACE OMS (ACE 1200 w/ 2 Drives)	\$Call
INTERTEC HeadStart VPU 512	\$Call
NEC PC-8201A (w/ 16K RAM)	\$479
PC-8801A (64K, 2 Drives, Software)	\$1199
SANYO MBC 555 (128K, 2 Drives)	\$Call
SWP Inc. Co-Power-88 (8088 w/ 256K)	
For Kaypro & Morrow Designs	\$Call
TELEVIDEO 1605/TPC-II	\$Call
VISUAL Computer	\$Call

FIRMWARE

ALS Smarter II (80-Col. Card)	\$135
AST RESEARCH INC.	
MEGA PLUS II (64K, Serial & Clock/Cal)	\$289
SIX PACK PLUS (64K, Serial/Par, Clock)	\$279
CARD CO Card?+ G (Commodore)	\$69
DIGITAL RESEARCH CP/M Gold Card	\$349
FOURTH DIMENSION 16K RAM Card	\$49
HERCULES Graphics Board (IBM)	\$349
INTERACT. STRU. PKASO Universal	\$125
KEYTRONIC IBM Keyboard (5150)	\$189
MA SYSTEMS PC Peacock	\$279
MICROLOG Baby Blue II (IBM)	\$539
MICROSOFT Softcard	\$229
ORANGE MICRO Buff. Grappler+ (16K)	\$169
QUADRAM QUAD 512+ w/ 64K	\$239
EXPANDED QUADBOARD w/ 64K	\$279
MICROFAZER Parl/Parl (64K)	\$185
TECHMAR Graphics Master	\$519

HARD DISK

CORVUS	DAVONG	(External)
12 MB	\$Call	10 MB
18 MB	\$2995	21 MB
GREAT LAKES 10 MB (IBM External)	\$1219	
QCS 10 MB Ext. w/ 5 MB Back-Up	\$2995	
TALLGRASS 12 MB w/ Tape Back-Up	\$2799	
TECMAR Removable 5 MB Cartridge	\$1479	
XCOMP 16 MB (IBM, Apple, Kaypro)	\$1749	

TERMINALS

ESPRIT ESP-6310	\$589
LIBERTY Freedom 110/200	\$Call
QUME 102/103/108	\$549/\$859/\$649
TELEVIDEO Personal Terminal	\$429
VISUAL 50/55	\$559/\$689
WYSE WY-100/300	\$659/\$995
ZENITH Z-29/ZTX-11	\$649/\$399

PRINTERS

BROTHER DX-15/HR-25	\$449/\$749
C-ITON Prowriter I 8510 AP	\$329
DAISYWRITER 2000 EXP	\$985
EPSON	
LQ-1500	\$1195
FX-80	\$469
HOUSTON INSTRUMENTS Plotters	\$Call
JUKI 6100 (17 CPS, Diablo Compat.)	\$Call
MANNESMANN TALLY	
MT 180L	\$799
NEC 2050/3530	\$815/\$1275
P2 Pinwriter	\$649
P3 Pinwriter	\$879
OKIDATA ML 92/ML 84	\$Call
OLYMPIA Compact R0/Compact 2	\$459/\$429
QUME Sprint 1140/1155	\$Call
ROLAND DXY-800 (11x17, 8 Pens)	\$739
SILVER-REED EXP 550/770	\$519/\$899
STAR MICRONICS	
Delta 10	\$409
Radix 15	\$699
STROBE Model 200/260	\$529/\$689
TEXAS INSTRUMENTS 850 RO	\$489
TOSHIBA P1340/1351	\$789/\$Call
TRANSTAR T120 / T130	\$419/\$579

MONITORS

AMDEK	
Video 300/300A/310A	\$135/\$145/\$165
Color II+	\$419
Color III+	\$379
GENTECH 9"/12" Green	\$85/\$95
PRINCETON GRAPHICS HX-12	\$489
Max-12 (12" Amber, TTL)	\$189
ROLAND, SAKATA All Models	\$Call
TAKAH RGBvision 210/420	\$269/\$459
KG-12N	\$119
KG-12N/UUY	\$129

MODEMS

ANCHOR Mark XII	\$265
-----------------	-------

HAYES Micromodem IIe	\$235
Smartmodem 300/1200/1200B	\$Call
NOVATION Apple Cat II (300 Baud)	\$225
103 Smart Cat (300 Baud)	\$169
U.S. ROBOTICS Password (1200 Baud)	\$319

SOFTWARE

LOTUS 1-2-3	\$329
MBSI Accounting Software	\$Call
MICROPRO WordStar Pro Pack (IBM)	\$399
MICROIM R-Base 4000	\$319

MISCELLANEOUS

HOUSTON INSTR. DT-114 Digitizer	\$779
RANA Elite One (163K, Apple Drive)	\$235
1000 w/ DOS (Atari)	\$309
TANDON TM 100-2 (DSDD Drive, IBM)	\$209
TEAC FD-55B (DSDD Thinline, IBM)	\$185

CUSTOMER SERVICE

401-273-2420

ORDERS ONLY

800-843-4302

150 Broadway, Suite 2212, N.Y., NY 10038
 Money Order, Cashier's Ck, Personal Ck (3 Weeks To Clear).
 Add 3% MC/VISA, 5% AMEX Charge. Add 2% On COD Orders.
 APO Orders Add 6%. Add 3% For Net Terms.
 All Returned Non-Defective Merchandise Are Subject To
 20% Restocking Charge.
 GenTech Reserves the Right to Change Advertised Prices.



CIRCLE 128 ON READER SERVICE CARD

FOCUS ON YOUR KAYPRO

You own a Kaypro 2, 4 or 10, and you use it all the time. Yet you know you can do more with it and get the software to work harder for you. The users manual has helped you, but a guide directing you to the functions you bought the Kaypro for is what you really need. **Look no futher, THE KAYPRO: AN APPLICATIONS GUIDE is here!**

This book is not a programming guide, nor is it a technical reference manual. It is a definitive guide on how you can maximize your unit's productivity. Among the topics discussed are:

- ☐ Using CP/M to its best advantage
- ☐ How MS/DOS can enhance your machine
- ☐ How to utilize Perfect Writer™ to its fullest and how to cut editing time in half
- ☐ Using Perfect Speller™ with a word processor
- ☐ How Perfect Filer™ can be used in a variety of list management and database applications
- ☐ Writing with WordStar™ and a comparison of WordStar and Perfect Writer
- ☐ Hooking up the Kaypro to a printer, and a configuration table for twenty of the most popular printers.

And specific case studies and uses for writers, academicians, teachers, physicians, lawyers, small businessmen and organizations.

If you own a Kaypro 2, 4 or 10, you need THE KAYPRO: AN APPLICATIONS GUIDE. Order your copy today! Only \$12.95!

Available in your local bookstore and computer store.

**For faster delivery, PHONE TOLL-FREE 9 am-5 pm E.S.T.:
1-800-631-8112 (In NJ only: 201-540-0445)**



CREATIVE COMPUTING PRESS

Dept. MB4B, 39 East Hanover Avenue, Morris Plains, NJ 07950

Please send me _____ copies of THE KAYPRO: AN APPLICATIONS GUIDE at \$12.95* plus \$2.00 postage and handling (\$5.00 outside USA) each. #70-4

Payment Enclosed \$_____ *Residents of CA, NJ and NY State add applicable sales tax.

Purchase Orders \$50 minimum.

Charge My: ☐ American Express ☐ MasterCard ☐ Visa

Card No. _____ Exp. Date _____

Mr./Mrs./Ms. _____ (print full name)

Address _____

City/State/Zip _____

☐ Please send free catalog.

Notebook Computing, continued...

Counting Words

Another program I keep in precious RAM most of the time is the word counter which appears here as Listing 2. The number one job my Model 100 performs is word processing, and when I am writing reviews and columns, I need to know just how long they are. This program lets me get a quick, approximate count, or a slow but exact word count.

When you run it, the program asks you which file to count and traps for errors. It contains two routines—the first approximates a count by counting only lines, and then using a round figure of 15 words per 80-column line to estimate an answer. If you have a higher fog index (use bigger words) than I do, try a lower number in line 260. If you are monosyllabic, increase that number. For my vocabulary, I find that 15 words per 80-column line is a good rule of thumb. For example, this paragraph and the ones preceding and following it come to a total of exactly 292 words. Using the approximation routine, you come up with a figure of 285, which is quite acceptable for most needs.

Why an approximation routine at all? Because counting words exactly takes up a whole lot of time on the Model 100. Using the second routine, counting this paragraph and the two before it takes a minute and 40 seconds. That may not look like much at first glance, but imagine what happens when you get up into the realm of 2000+ words. Most of the time it is better to use five minutes revising your text than waiting for an exact word count. That's why the approximation method gets more frequent use. It counts up these last three paragraphs in under three seconds.

Of course when you count words exactly on a computer, you really count the spaces between words. That is what is happening in lines 310-370. At the end of the program you can either get a word count on another file or to exit back to the menu.

Keep In Touch

Dave and I very much enjoy hearing from you portable owners—keep the cards and letters coming in. Send in a tape of your latest game, demo, or artistic creation.

Anybody out there want to save us the trouble of writing an LCD graphics screen-save routine? We'll print it here, if it is short enough and sweet enough. Anybody figured out how to disable the break key? Give us a call. We'll credit the secret to you.

Until next time, keep your penlights fresh, your nicads charged, and your LCD out of direct sunlight. See you same place next time.

END

Free and Easy

using a Business Plotter is difficult and expensive, right? Wrong! That's the way things used to be. Roland DG's new hardware/software package not only makes plotting easy, it also makes part of the deal free!

During the months of April, May and June with the purchase of a Roland DG DXY-800 8-Pen X-Y Plotter, you get the KeyChart Presentation Graphics Software to run the plotter—*Absolutely Free!* A savings of \$375.00.

At the heart of the package is the Roland DG DXY-800 X-Y Plotter, (the lowest priced 8-pen plotter on the market). The DXY-800 is an 8-pen intelligent plotter offering an 11" x 17" plot bed, Centronics parallel and RS-232 serial interfaces, and can also be used in either a horizontal (60 degree inclined) position, to conserve your desk-top space. Use regular paper or even acetate to produce overhead projection graphics.

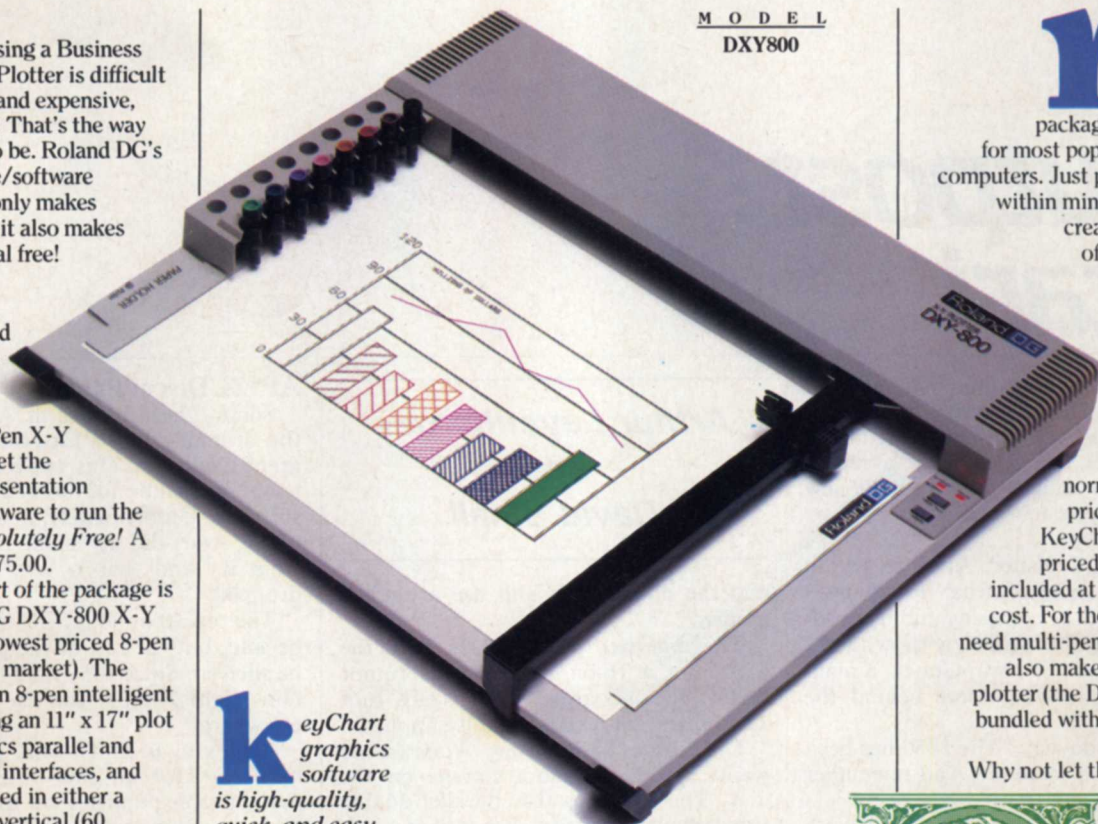
Next add KeyChart, probably the quickest, and easiest software program for generating presentation-quality business graphics. You don't have to be a programmer to use KeyChart. It is completely menu-driven and can provide automatic default values for every characteristic. Load in your data from the keyboard, or from almost any electronic spreadsheet, including Lotus 1-2-3.

keyChart graphics software is high-quality, quick, and easy.

Why not take the work out of your next business presentation?



MODEL
DXY800



roland DG's DXY-800 KeyChart package is available for most popular personal computers. Just plug it in, and within minutes you'll be creating the kind of graphics you thought might take days of programming. All of this comes to you for the DXY-800's normal low retail price of \$995.00. KeyChart, normally priced at \$375.00 is included at no additional cost. For those who don't need multi-pens, Roland DG also makes a single pen plotter (the DXY-101), also bundled with KeyChart for only \$750.00. Why not let the Roland DG

graphics system improve the quality of your business presentations? But you'd better

hurry, this kind of free and easy dealing isn't going to last forever, just until June 30th. For a dealer near you contact: Roland DG, 7200 Dominion Circle, Los Angeles, CA 90040, (213) 685-5141.



thanks to Roland DG, KeyChart can come to you for free.

KeyChart is a trademark of SoftKey Software Products Inc. Lotus and 1-2-3 are trademarks of Lotus Development Corp.

Roland DG



Outpost: Atari

In this month's Outpost, an old friend, David Small, shares the honors with columnist Art Leyenberger. David brings us news gleaned from a recent visit to Atari, and Art talks about new books of interest to Atari users.

David starts:

In March, I visited Atari to try to make some sense of what I had been hearing about the company and its products. Among the people with whom I spoke there was Sherwin Gooch, a manager and the driving force behind the 1450 XLD.

"What?" you ask. "The 1450 has been cancelled." Ah, read on. And remember you heard it here first.

Sherwin is the head of a small, very talented group of people working on the 1450. When I visited, they were putting the final touches on the design. In spite of parts availability problems, politics, layoffs, and resignations, Sherwin hung on, dedicated not only to doing a fine machine design, but, in his words, to "getting the 1450 out the door. It's just like *The Soul of a New Machine* (Tracy Kidder's fine book about the development of a new Data General machine). What doesn't matter is the politics, the problems, or the hassles. What counts is getting the machine out the door. That is what computer companies are judged by, not the rumors of grandiose machines 'under development,' but what goes out the door. And if it kills me, the 1450 XLD is going to get out the door." When? He could not say, officially; I will say June. This year.

And my, what Sherwin has wrought. This machine can sing! That's right. And talk—better than any speech synthesizer you have heard. It can also answer your phone with its speech synthesizer. Or

Arthur Leyenberger and David Small

dial the phone itself and use a built-in modem.

The internal processor is still the 6502, not a 16-bit variation (as rumor had it), the onboard memory is 64K (not 128K), and on-board Basic is supplied.

Disk drives? I bet every Atari owner wants speed and more storage on the disk. The 1450 has true parallel double sided, double density disk drives, with 256-byte sectors. This gives around 360K of data per disk, and access to it is very, very fast; it takes just 36 seconds to transfer the data from the entire disk into memory. A disk copy takes twice that, or 72 seconds.

The operating system is very sophisticated, yet manages to stay compatible with software for the 400/800 series machines. This is an extremely significant and intelligent move; it means that the 1450 will be able to run all sorts of software at the time it hits the market.

When I was at Atari, I saw Sherwin working through an idea to make the output from POKEY (the sound chip) be the input to the speech synthesizer, so you could get a really neat "talking sound" effect. I don't know if this will be included or not; the machine was near "close date," the time when things are not supposed to be changed. If it is there, you will surely see some really neat software using this effect—just as soon as software houses figure out how it works.

APEX Discontinued

Some other changes at Atari include the dropping of APEX, the Atari Program Exchange. This was a low cost distribution center for user written Atari software. Unfortunately, it was too "low cost"; Atari did not make much money from it. And that is why APEX was dropped.

The top 20 or so APEX titles will still be sold, but the rest of the products will be shelved. Since the original authors retain rights, they can be distributed elsewhere.

Kudos to Fred Thorlin, the manager of APEX for all this time; he helped many people publish their first programs and got a wide variety of software "out the door." Fred is no longer with Atari, but his contribution should not be forgotten.

Star Network

Another interesting Atari product you may be hearing about is the Star network. The Star allows up to 64 Atari computers to be tied to a few common disk drives and printers. This makes it absolutely ideal for classroom situations, for it means a group of students can share a resource.

The Star was originally developed by MECC (Minnesota Educational Computing Consortium) and Atari bought the rights. The project then languished because of internal disruption at Atari. But if you are an educator looking for an inexpensive (\$50 or so per Atari to connect it to the network), well engineered method of setting up a classroom full of Ataris, it would behoove you to write Atari and ask them to make this product widely available. (It is already installed in a few Bay Area schools.)

Art picks it up from here:

The Atari Bookshelf

Hundreds of books on computing have come out so far this year. Just as sales of Atari computers represent a small fraction of the computer market, the number of books pertaining to the Atari is equally small. Still the titles number in the dozens, so some recommendations in this column are long overdue.

There are two books that every Atari computer user *must* have. The first one has been around for almost two years. Still, its content and organization represent the best single reference for Atari information. *Your Atari Computer* by Lon Poole, Martin McNiff, and Steven Cook is published by Osborne/McGraw-Hill and affectionately called "The Purple Book." This \$16 book covers the Atari computer system and Atari 8K Basic. The section on introductory and advanced graphics is one of the best I have seen anywhere.

Although the Purple Book does not discuss the XL computers, the information is still relevant. The appendices alone are probably worth the price of the book. They include material on memory usage, error messages, functions, PEEK and POKE locations, and conversion tables. Also, there are numerous programs and examples that reinforce the written information.

The other Atari related book that is a *must have* is a new one published by The Book Company. Written by Gary Phillips and Jerry White, the book is titled *The Atari User's Encyclopedia*. It is an up-to-date compilation of useful information for the Atari 400, 800 or XL computer owner. Everything from Basic to Action is discussed.

The format of the book is alphabetical entries by subject. Entries include descriptions of programming languages, one-paragraph summaries of software, and listings of publications and user groups. There is also a Basic tutorial at the beginning of the book complete with program listings and explanations. This 267-page, \$20 book is a valuable resource.

Hayden has several titles on programming your Atari computer in Basic. Aimed at children 3 to 7 years old, *The Atari Playground* by Fred D'Ignazio contains 23 programs covering a broad range of subjects. Each of the programs has a story associated with it to reinforce the learning of word and number skills. The book explains how to participate in a spelling bee, draw with a computer crayon, watch ghosts appear and disappear, and play games against the Atari.

Fred has written another similar book called *Atari in Wonderland*. This book is meant for children ages 6 to 10. Here they learn how to write a book report, create songs, test reflexes, and count in French and Spanish among other things. Both of Fred's books cost \$9.95 and include, in addition to the program listings, instructions for using the Atari graphic keys. Suggestions for program modifications are also given. There will soon be a cassette tape of the programs in both of these books.

Another new book from Hayden is *Basic Atari Basic* by Jim Coan and Richard Kushner. This \$14.95 book is not simply another variation of Coan's Basic programming text which has been

The Atari Playground by Fred D'Ignazio contains 23 programs covering a broad range of subjects.

adapted to several computers. Rather, it has been extensively re-written to include Atari-specific information on such subjects as XL graphics modes 12 through 15, sound, and player-missile graphics.

An interesting new book is Jack Hardy's *Adventures with the Atari* published by Reston. No, this is not a book about getting software to run on the XL machines. Instead, it is a book about writing adventure games in three different programming languages: Pilot, Microsoft Basic, and Atari 8K Basic. Hardy gets you started designing and writing your own adventure games by including numerous examples of techniques and several complete games.

A systematic approach to adventure game writing is stressed, and the following subjects are covered: the game scenario, the objects, the map, the flow-chart, keying the program, and play testing the game. Although this book is not for beginners, if you have an interest in adventure games you might want to check it out. \$14.95 in paperback.

Atari Programming with 55 Programs by Linda Schreiber is another Basic programming book that has the advantage of giving you dozens of programs in addition to teaching you Basic. Although some of the programs are trivial

and meant only for illustrating certain aspects of Basic programming on the Atari computer, there are *many* useful programs. Some are most useful as sub-routines in your own programs. This is especially true for routines such as using the console keys, using the joysticks and paddles for input, and generating random numbers.

A description of each of the programs is given, including what specific Basic statements are used in the routines and how they accomplish the objective of the program. *Atari Programming* is published by Tab Books and sells for \$14.50.

The last "learn how to program" book I will mention is called *Atari Player-Missile Graphics in Basic* by Philip Seyer. This \$14.95 book is also published by Reston and is a good introduction to this sometimes difficult to understand topic. A step by step approach is used, and plenty of examples illustrate the various aspects of PMG.

A general book that I think is one of the best introductions to what computers are all about is called *Through the Micro Maze* written by Wayne Creekmore and published by Ashton-Tate. At first glance, \$9.95 for a thin, 64-page, "glossy look" intro to computing may seem rather steep. But from the moment you begin to read page 1, you start to learn.

The text is brief but well written; the visuals are numerous and extremely easy to read; and each page is chock full of information. The material is far from being Atari-specific, but the basics of computing are well covered. The best way I can describe this book is to quote the author's brief dedication: "This book is dedicated to those of you who are curious about computers, want to buy one, are scared to death of them, don't understand the one you own, and don't like to read for hours." Excellent job, Wayne.

The last several books will not necessarily teach you *how* to program. They will not tell you secrets about making your programs run 30 percent faster. Nor will they give you a list of POKE locations in the appendix. What they will do is expand your mind if you read slowly and carefully digest the information you are reading.

One such book is *Genesis II* by Dale Peterson. The appropriate subtitle of the book is "Creation and Recreation with Computers." This thought-provoking book covers the gamut of computer-related topics from painting, music, and literature to games and the power of computers. The relationship between technology and the arts is explained by using many examples of how computers have added a new dimension to the

Outpost: Atari, continued...

visual arts.

Other highlights of the book include a layperson's guide to computer graphics, a short history of computer games and their impact on society, and interviews with leading computer artists. *Genesis II* is well worth reading. Reston Publishing, \$19.95.

Another thoughtful book that will have you reaching for your thinking cap is *The Art of Computer Games Design* by the one and only Chris Crawford, the premier game designer for Atari and until March of this year Atari's manager of research.

In this book, Crawford emphasizes the artistic dimension of computer games. In this way he reveals computer games design as a creative process rather than merely a technical one. He states that the central theme of the book is "that computer games constitute a new and poorly developed art form that holds great promise for both the game designer and the game player."

This book is must reading for anyone interested in game design or even those who just like to play computer games. Written well, it reads more like a novel than non-fiction. Osborne/McGraw-Hill, \$14.95.

If you are really interested in why

people play computer games, you may want to look at Geoffrey and Elizabeth Loftus's *Mind at Play: The Psychology of Video Games*. Both authors are cognitive psychologists, which occasionally makes the book a little bit technical. But the material is provocative nonetheless. Here is a sample, quoting the well-known psychologist Philip Zimbardo: "The video games that are proving so addictive to young people may not only

be socially isolating but actually encourage violence between people." The authors discuss this point and mention games such as *Frogger* and *Donkey Kong* as evidence that the current crop of video games is turning away from violence as the central theme. You may not agree with everything in the book, but you are sure to read logical arguments for what is being proposed. Basic Books, \$14.95.

Firms Mentioned in this Column

Ashton-Tate
10150 West Jefferson Blvd.
Culver City, CA 90230
(213) 204-5570

Basic Books
10 E. 53rd St.
New York, NY 10022
(212) 207-7057

Hayden Books
10 Mulholland Dr.
Hasbrouck Heights, NJ 07604
(201) 393-6000

Osborne/McGraw-Hill Book Company
2600 Tenth St.
Berkeley, CA 94710
(415) 548-2805

Reston Publishing
11480 Sunset Hills Rd.
Reston, VA 22090
(703) 437-8900

Howard W. Sams
4300 W. 62nd St.
Indianapolis, IN 46268
(317) 298-5400

Tab Books
P.O. Box 40, Monterey Ln.
Blue Ridge Summit, PA 17214
(717) 794-2191

FREE CATALOG!

SAVE MONEY on Computer Supplies from NEBS.



NEBS is a leader in providing small businesses with hundreds of low-priced, top quality computer products:

- Continuous Checks, Statements
- Invoices and Letterheads
- Diskettes
- Ribbons
- Furniture
- Accessories

Keep your computer running smoothly and profitably.

Call Toll Free 1-800-325-1117 for your FREE NEBS Computer Forms Catalog or complete and return the coupon below.



NEBS Computer Forms
12 South Street
Townsend, MA 01469
Attn: Customer Service

Name _____

Title _____

Company Name _____

Street Address _____

City, State _____ Zip _____

CODE 14615

COMPLETE YOUR LIBRARY OF creative computing



Add to your CREATIVE COMPUTING collection today. Make your personal library complete and authoritative with any issues you may be missing.

Copies are available for issues published during the last twelve months—be sure to specify the issues you want. If a particular issue is out of stock, your payment will be refunded promptly.

Back issues of CREATIVE COMPUTING are priced at \$6.00 each, postpaid. Outside USA, \$7.00 each.

CREATIVE COMPUTING

MCBI

CN 1914 Morristown, NJ 07960

Please send issues of CREATIVE COMPUTING listed below:

Issue	Qty.	Unit Price	Total Price
Payment Enclosed			\$

Mr./Mrs./Ms. _____ (print full name)

Address _____

City/State/Zip _____

IBM Images



The West Coast Computer Faire, once one of the most exciting and offbeat of the silicon set, was just another show this year. There were few new products introduced, and these were not particularly visionary. Two companies actually went to the trouble of designing *WordStar* Doppelgangers, spiritlessly duplicating the random key sequences of this venerable program.

If there was any focus at all to this show, I'd say it centered around the Macintosh, with a small smattering of improved mass storage devices for the PC. Several companies showed XT-type fixed disk drives. These are meant to be internal and do not require device drivers at boot time.

XComp is selling a super-floppy drive that will be able to store 2.5 Mb (formatted) on a single 5 1/4" preformatted disk. The drive itself is half height. XComp will also be selling a small auxiliary cabinet containing a fixed disk drive plus one super floppy for backup purposes.

Quadram introduced a sweet little color ink jet printer, smaller than the Epson, which uses snap-in cartridges. The printer is perfectly silent in operation and has a reasonable resolution for graphics at 640 dots per line. It will retail for about \$895. Quadram also introduced a unique display card for the IBM PC. The Quadvue is a six-function monochrome card which supports word processing in up to four different fonts. According to the press release, the user will get an exact duplication of the on-screen fonts on the printer, but there is no mention of the printer(s) supported. Software is provided for custom font generation; this should make APL users, scientists, and Aramaic scholars very

Susan Glinert-Cole

happy. The board also has a parallel port, one or two serial ports, and a clock calendar. The price is only \$345.

The highlight of my particular West Coast experience had nothing to do with IBM products at all and, by rights, doesn't belong in this column. Ah well. I finally saw Niklaus Wirth's Modula 2 computer, appropriately named Lillith. For those of you unacquainted with this bit-slice machine, it was designed as a system developer's tool par excellence,

Heathkit is selling a do-it-yourself PC.

running only Modula 2. Heretofore only available at great custom expense, the computer is now being manufactured commercially by Modula Computer Systems expressly for the system developers market. Housed in a beautifully finished walnut cabinet decorated with hand-caned vent holes on the sides, it was attached to a Ball monitor. The resolution on this display makes the Lisa screen look like a furry TV picture by comparison. The software tools demonstrated included an editor capable of multiple fonts, windows and other esoterica, and a set of debugging tools that would bring tears to the eyes of any programmer. The software relies heavily on pull-down menus, invoked by a globular mouse. Considering the power of this machine,

the prices, beginning at \$7500 for a system unit and an IBM-type monitor, are unusually reasonable.

The game market has apparently dried up for the PC. I saw only one or two offerings, and these were mostly educational game/lesson products designed to seduce kids with the wiles of algebra and spelling. *Wizardry*, from SirTech, is a popular Apple game now available for the PC. It is a fantasy role-playing game, and, while I haven't personally played it, several people have recommended it to me as entertaining.

For those of you who enjoy diddling with solder, Heathkit is selling a do-it-yourself PC. For something around \$1895, you get everything you need to build your own clone, which includes one disk drive (but no monitor). They will shortly be introducing a similar kit for a PC-compatible portable.

The West Coast Faire **nightlife** wasn't much this year either. **Ziff-Davis** had two parties, one of which featured **steak tartare** and **Adam Osborne**. **Microsoft** staged a luxurious do at the **Flood Mansion**, with a breathtaking view of the San Francisco harbor. Your correspondent was wedged between the **melon and prosciutto** and the **pâté** for several hours watching famous people reduce the hors d'oeuvres to **rubble**.

Snipes

Snipes, a clever and addictive game, was originally written as a diversion for Novell's networks, but is now offered for the stand-alone PC by SuperSet Software. The point of the game is to maneuver the hunter through a maze while searching out and destroying the portals through which the nasty snipes emerge.

Snipes will track you through the

CHALLENGING GAME BOOKS FROM CREATIVE COMPUTING PRESS

BASIC COMPUTER GAMES, Microcomputer Edition, edited by David H. Ahl. Here's a great collection of 101 fascinating games, all written in easy-to-use Microsoft BASIC. Play Craps, Combat, Super Star Trek, Lunar LEM Rocket, Gomoko, Checkers, Boxing, Bowling—and 93 others! With an introduction, notes on Microsoft BASIC, and conversion instructions for other BASICs. 8 1/4" x 11", softcover, illustrated with an index. \$7.95 (\$1.50). #6C

MORE BASIC COMPUTER GAMES, edited by David H. Ahl and Steve North. In this sequel to *Basic Computer Games* you'll find 84 challenging new games, complete with sample runs, program listings and illustrations. All run in Microsoft BASIC. Race your Ferrari, become a millionaire, joust with a knight, crack a safe, and more! Conversion table to other BASICs included. 8 1/4" x 11", softcover, illustrated. \$7.95 (\$1.50). #6C2
TRS-80" Microcomputer Edition, \$7.95 (\$1.50). #6C4



BIG COMPUTER GAMES, edited by David H. Ahl. This book provides countless hours of entertainment and excellent educational introduction to game writing and programming through a challenging collection of computer games adapted from CREATIVE COMPUTING Magazine. You'll find classic simulations and strategy games, including Streets of the City, Presidential Election, Lost and Forgotten Island, Cribbage, Dukedom, Monster Attack and many others. There are also articles on how to add video to computer games, and how to use the computer as a "Dungeon Master." All programs are written in Microsoft™ BASIC and are compatible with the new MSX standard. 8 1/4" x 10 3/4", softcover, illustrated. \$9.95 (\$1.50). #13C

CREATIVE COMPUTING PRESS Dept. MD2C
39 East Hanover Avenue, Morris Plains, NJ 07950

Send me the books listed below:

ITEM NO.	QTY.	TITLE	PRICE EACH	P & H* ()	TOTAL

CA, NJ and NY residents add applicable sales tax

TOTAL AMOUNT:

Payment Enclosed \$_____ *Outside USA add \$3 per order.

Charge My: (\$10 minimum)

☐ Am Ex ☐ MC ☐ VISA

Card No. _____ Exp. Date _____

Mr./Mrs./Ms. _____
(please print full name)

Address _____ Apt. _____

City _____ State _____ Zip _____

For faster delivery, CALL TOLL FREE 800-631-8112.
(In NJ only: 201-540-0445)

Also available at your local bookstore or computer store.

IBM Images, continued...

maze, and have a rather alarming degree of accuracy when they shoot at you. The longer you take to find the portals, the more snipes scuttle into the maze.

There are many levels to this game: you can set the maximum number of snipes allowed in the maze, the number of portals, and the degree of nastiness the snipes' weapons will have. At the higher levels, the walls of the maze become dangerous as well. The game will run on either a monochrome or a color display and is proof positive that network companies, devoted as they are to the serious business of office automation, can still maintain a sense of humor.

Active Trace

Through several momentary lapses in memory, I have acquired a couple of copies of a really neat utility from Awareco, called *Active Trace*. This set of programs is designed to untangle even the most convoluted Basic program by presenting the user with maps of variables, subroutine calls, and line number references. VREF is used to obtain a list of variable references by line number; GOREF does the same for GOTOS and GOSUBS. These programs require minimal input on the part of the programmer and will write the output to a disk file, the printer, or both.

While these two programs work well and are fairly fast, the star of the Awareco lineup is SCOPE. This utility lets you trace a program line by line, presenting you with the values of selected variables at each step of the way. A comprehensive set of menus lets you select such parameters as specific line numbers and variables to analyze, the

specific interpreter you are working with, alternate reserve word lists, and particular command file to execute when SCOPE is invoked. This program, in conjunction with the VREF and GOREF, makes a powerful set of debugging tools for the Basic programmer. The programs are not copy-protected.

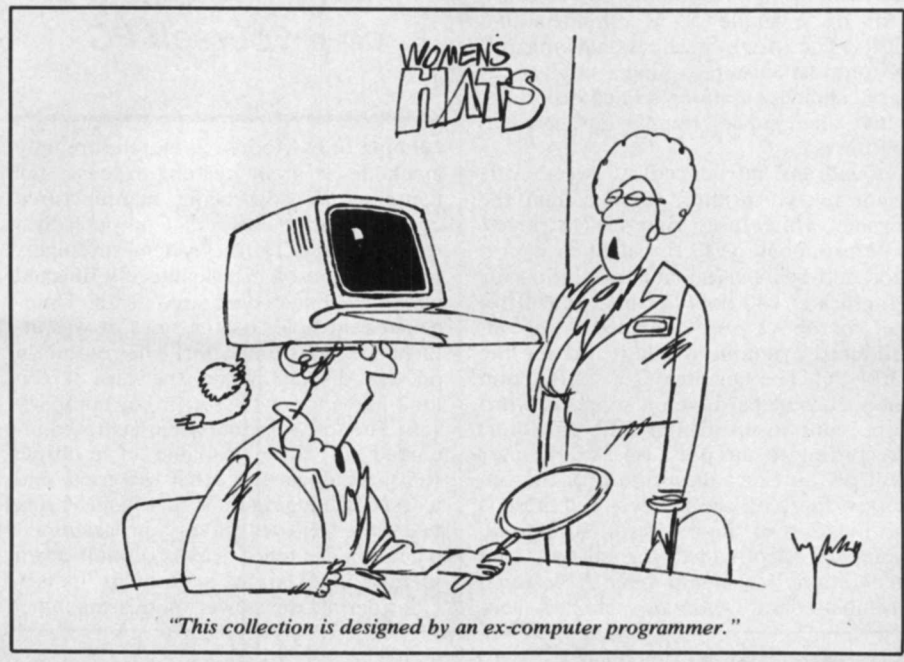
The people at Awareco seem to put a premium on holding the user's hand. The documentation is almost worth the price of the package. While not particularly elegant in looks, it is a marvelous

**Digital Research threw
in the towel with
regard to the place of
CP/M in the 16-bit
world and now offers
their very popular
compilers under
PC-DOS.**

exposition on programming philosophy and has some very unexpected and funny remarks scattered within. The program set sells for \$79.95 and includes a newsletter with a picture of the Gosub Guru swallowing a seven foot length of spaghetti code.

CBasic and the GSX Module

Digital Research threw in the towel with regard to the place of CP/M in the 16-bit world and now offers their very



Summer 1984 Sweepstakes

This Color Computer System Can Be Yours...

FREE!



You can win this TRS-80 Color Computer System, worth over \$1500, just by entering the COMPUTERS & ELECTRONICS SUMMER 1984 SWEEPSTAKES! No purchase is necessary... just send us your entry!

You could win this incredible system including a 64K RAM Color Computer 2 with Extended BASIC, a Disk Drive, 2 Deluxe Joysticks and the full feature Daisy Wheel Printer 210! Create exciting graphics, store information, play mind-boggling games and tap into the abundant array of programs available for the TRS-80 Color Computer!

ALL YOU HAVE TO DO IS RETURN YOUR ENTRY FORM!

While you're thinking about your chances to win, now is a great time to subscribe to the magazine that brings you the technology of tomorrow, today! When you subscribe to COMPUTERS & ELECTRONICS you're getting the largest computer magazine, featuring "hands-on" articles telling you how to dissect a ROM Cartridge OR add-on the right peripherals and hardware to make any good system into a *great* system!

Take a chance and go with a sure thing—enter the SUMMER 1984 SWEEPSTAKES and SUBSCRIBE TO COMPUTERS & ELECTRONICS TODAY!

OFFICIAL RULES:

NO PURCHASE NECESSARY

1. On an official entry form or a 3" x 5" piece of paper, hand-print your name, address and zip-code. Enter as often as you wish, but mail each entry separately to COMPUTERS & ELECTRONICS SUMMER 1984 SWEEPSTAKES, P.O. Box 2782, Boulder, Colorado 80322. Entries must be received no later than August 30, 1984, and the drawing will be held by September 28, 1984. All entries become the property of COMPUTERS & ELECTRONICS, which reserves the right to reprint the name and address of the winner.
2. The winner will be selected in a random drawing from among all entries received, under the supervision of the publishers of COMPUTERS & ELECTRONICS, whose decision will be final. Only one prize will be awarded in this Sweepstakes. Winner will be notified by mail and may be required to execute affidavit of eligibility and release. Odds of winning will depend on the number of entries received. Ziff-Davis will arrange delivery of prize. Taxes are the responsibility of the winner. Any manufacturer's warranties will apply, but Ziff-Davis makes no warranties with regard to any prizes. Prize is not transferable. No substitution for prizes.
3. Sweepstakes open to all residents of the U.S., its territories and possessions, except employees (and their families) of Ziff-Davis Publishing Company, its affiliates and its advertising and promotion agencies. Void wherever prohibited or restricted by law.
4. For the winner's name, send a stamped, self-addressed envelope to COMPUTERS & ELECTRONICS SUMMER 1984 SWEEPSTAKES, Circulation Department, Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016.

Summer 1984 Sweepstakes

P.O. Box 2782, Boulder, Colorado 80322

OFFICIAL ENTRY FORM

☐ **YES!** Enter my name in the Computers & Electronics Summer 1984 Sweepstakes, and start my subscription to COMPUTERS & ELECTRONICS for the term checked:
☐ One year for \$12.97. I SAVE 24%! ☐ Two years for \$22.97. I SAVE 32%! ☐ Three years for \$31.97. I SAVE 37%!

Savings based on full one-year (12 issues) subscription price of \$16.97.

☐ **NO,** I don't wish to subscribe to COMPUTERS & ELECTRONICS now, but tell me if I've won the Summer 1984 Sweepstakes.

Mr/Mrs/Ms _____

Company _____

Address _____

City _____

State _____

Zip _____

Check one: ☐ Payment enclosed ☐ Bill me later

Charge my: ☐ American Express ☐ MasterCard ☐ Visa

Card No. _____

Exp. Date _____

Offer valid only in the U.S., its territories and possessions.

Please allow 30 to 60 days for delivery of first issue.



CE8H724

Inmac makes it easy to make your computer work harder.

Choose from over 1500 products, all specially selected to help you get more out of your computer.

- **One-stop shopping.** Paper, connectors, cables, more. Many exclusive Inmac products, too.
- **Easy ordering.** Mail, phone or TWX. Verbal P.O.'s welcome.
- **Lower shipping costs.** All 9 Inmac distribution centers are fully stocked, so your order can be shipped from the nearest center.
- **45-day risk-free trial.** Full refund if not completely satisfied.
- **Guaranteed quality.** Most guaranteed for one year, some guaranteed for life.

1-800-547-5444.*

inmac

Please send me a free copy of Inmac's Personal Computer Support Catalog.

Inmac Catalog Dept.
2465 Augustine Drive
Santa Clara, CA 95051

NAME _____

COMPANY _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____ PHONE _____

*In California, call 1-800-547-5447 for your free catalog.

CIRCLE 137 ON READER SERVICE CARD

ANIMATION

that's fast, smooth, and flicker free! Write, produce, and direct your own computer movies. No programming skills are needed to create superb full-color animation. With easy to use TAKE-1, you define animation shapes and movements, "shoot" scenes frame-by-frame, add text at any time, and then combine the scenes to make a complete movie. Perfect for presentations and demos.

Available at your local software store or direct from BAUDVILLE. \$59.95 Requires 64K Visa and Master Charge accepted, Michigan residents add 4% sales tax.

For Apple IIc, IIe, and II+ or compatible computers. Apple is a registered trademark of Apple Computer, Inc.

BAUDVILLE

BAUDVILLE, 1001 Medical Park Dr., S.E.
Grand Rapids, Michigan 49506
Phone (616) 957-3036

CIRCLE 108 ON READER SERVICE CARD

IBM Images, continued...

popular compilers under PC-DOS. I have had the opportunity to look at two of them briefly: Pascal MT+ and CBasic with the graphics extension (GSX-86). Both languages have features unavailable in the comparable Microsoft versions. MT+ for example, supports overlays, allows in-line assembly code, and lets you painlessly perform DOS function calls from within a program.

The CBasic compiler has some handy bells and whistles like COMMAND\$, which returns a command string used when the program was invoked. MATCH returns the position of the first occurrence of a particular character pattern in a string. SADD returns the address of a specified string. UCASE\$ will convert lowercase characters to uppercase.

There are also several statements and functions in CBasic designed for use in multi-user/tasking environments. For example, ATTACH returns a Boolean value indicating whether or not a specified printer is available for program use. If the printer is available, ATTACH attaches it to the program, thus allowing it to be accessed. DETACH does the opposite, making the printer unavailable to the applications program. The functions LOCK and its opposite number, UNLOCK, are used for coordinating record access in a multi-user situation. LOCK prevents a program from modifying a record; UNLOCK releases the record for write access.

CBasic does not support any music functions in the present version (2.1), nor is there the elaborate range of "ON (device) GOSUB" available in MS-Basic.

The documentation is uneven; in some places it is lucid, while in others it tends to wander and confuse by omission. There are several reserved words for which no explanation is given. Both the MT+ and the CBasic compilers have a very difficult time with the end of a source code file. MT+ absolutely requires a carriage return after the final END statement. If this is omitted, the compiler freezes the system, requiring a hard reset. The CB compiler was very unhappy about the way my text editor ends a file (it does not insert any control characters). The compiler found 47 errors of the "invalid character in source file" when it failed to locate a Ctrl-Z after the final END statement. It was, however, indifferent to the presence or absence of a carriage return. Microsoft's compilers are uniformly happy with the files produced by my editor, and the inconsistent requirements of Digital's compilers are irritating.

The original CBasic-86, which runs under CP/M-86, did not have any graphics support for the IBM-PC. Happily, the folks at Digital Research rem-

edied this omission when they reissued the PC-DOS version. The graphics extension to CBasic is fairly complete and sophisticated on the face of it, but several features described in the manual are not really all there. It comes with quite a few printer and video drivers supporting the Hercules monochrome and the IBM color graphics board, the Microsoft and Mouse Systems mice and 16 printers and plotters.

GSX-86 is designed to be device independent, that is, all graphic output devices like displays, plotters, and printers, appear the same to the applications program. If you decide, for example, to output to a plotter instead of the console, no changes are required in the program code. Getting the proper drivers installed can be a little tricky. The manual has been superseded in places by several lengthy READ.ME files on the GSX-86 disk, and if you are so foolish as to try the installation without having thoroughly read them, you will have numerous unpleasant surprises in store.

There are about 25 statements in the graphics module that augment the CBasic language. Some of them have a counterpart in Microsoft Basic: CLEAR/CLS and MAT FILL/PAINT, for example. There are, alas, no statements in the GSX-86 module comparable to PSET, nor does there appear to be a way to set the background color of the display.

The remainder of the CBasic statements are unique and are more oriented towards business graphics than scribble and draw programs. Several statements are useful for making classy graphs. CHARACTER HEIGHT defines the height of letters relative to the length of the Y coordinate. TEXT ANGLE sets the tilt at which the text will print relative to the horizontal. LINE STYLE lets you set the type of line for any subsequent PLOT or MAT PLOT statement. Four standard styles are given: solid, dashed, dotted, and dashed-dotted. ASK STYLE COUNT returns the line styles available on the current open device. Marker types, of which there are at least five, can be selected with SET MARKER TYPE. Market height, relative to the current extent of the Y coordinate, can also be specified with SET MARKER HEIGHT. An entire array of X and Y coordinates can be plotted with markers with one MAT MARKER statement; this is obviously very useful for drawing point graphs in a speedy manner.

The range of the coordinate system is established using a SET WINDOW followed by the X and Y bounds of the corners. This statement can be used to alter the aspect ratio of a device as well. The actual window boundaries can be changed with SET VIEWPORT followed

To master the computer, master the software

Challenge your ability. Take charge of your computer. Take pride in the results.

You've invested in the computer. Now invest in yourself. Writing your own software lets you define your own boundaries, broaden your problem-solving resources and puts you in complete command at the keyboard. It's challenging. It's exciting. And now it's easier than ever before with Self-Study Computer Courses from Heathkit/Zenith.

Master today's most powerful contemporary languages including Microsoft BASIC, PASCAL and FORTRAN. And learn the popular CP/M and MS-DOS operating systems, too. When you need to know, we'll take you as far as you want to go.

For more information, send for our FREE colorful catalog below or circle the reader service number.



Our colorful catalog is FREE! If coupon is missing write: Heath Company, Dept. 355-192, Benton Harbor, MI 49022.



Send for yours today!
FREE CATALOG

Mail to: Heath Company
Dept. 355-192
Benton Harbor, MI 49022

Name _____
Address _____
City _____
State _____ Zip _____
CP-225

Heathkit®
Heathkit/Zenith

CIRCLE 131 ON READER SERVICE CARD

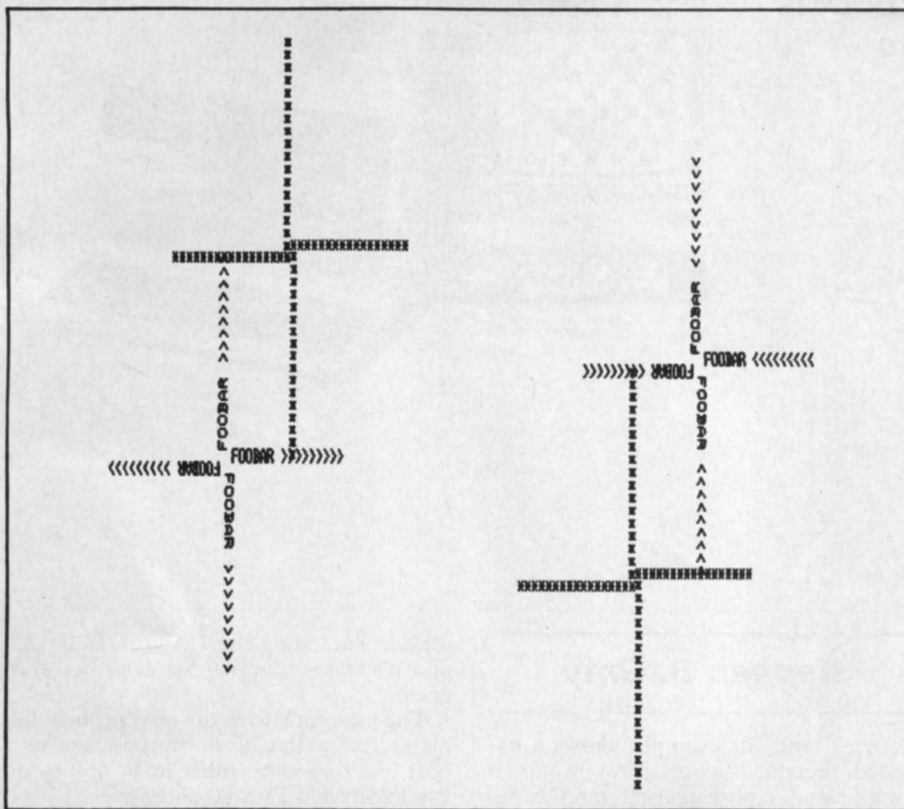


Figure 1. Printout from FOOBAR.BAS using the GSX-86 device driver.

Third, if you are so unwise as to turn off the printer while it is printing, the program makes a very ungraceful exit. This is somewhat better than the fourth complaint: you cannot break out of the program at all without resetting the computer. The `GOTO X` line, while allowing the picture to remain on the

screen as long as I wanted to see tilted lines of FOOBARs, also forced me to reset the computer when I got bored with the display.

Speaking of Reset . . .

For reasons too lengthy to go into here, I received a new Combo card from

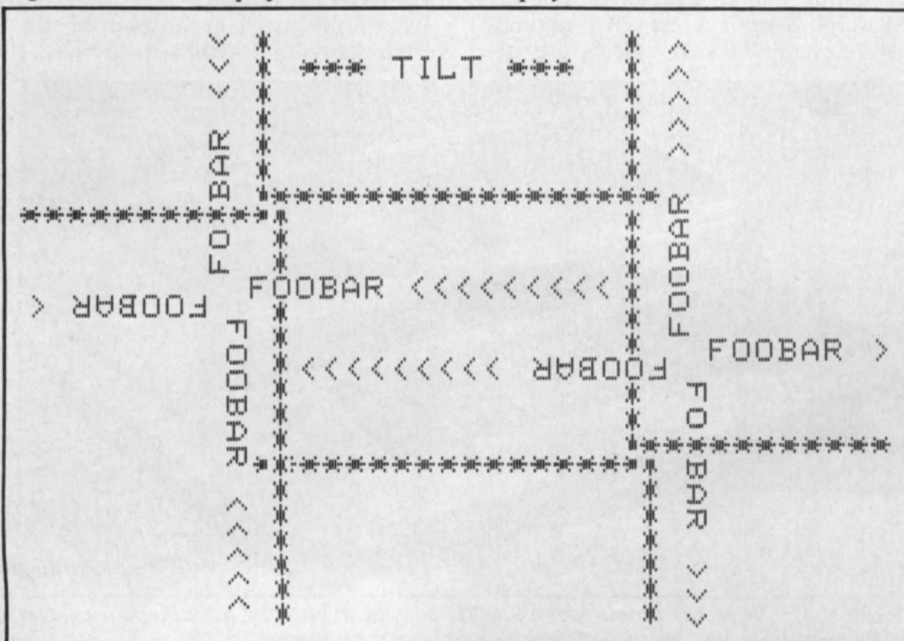



Figure 2. Screen dump of the FOOBAR.BAS display.

Apparat. Along with the plebeian clock/calendar, serial, parallel, and game ports, there is a little gizmo called a reset switch. This last fits neatly into the knockout plug at the rear of the PC and performs a function many programmers will find irreplaceable. I call it a squishy reset, because it is midway between a soft reset, done with the CTRL-ALT-DEL key combination and the hard reset performed by turning the computer off, waiting, turning the computer on, waiting, waiting, waiting . . . Every time the soft reset fails to bring life back to my display, pressing the squishy reset switch manages to do it without requiring a power-down. If you are a programmer who spends a lot of time flicking the PC ON/OFF switch, I recommend this little addition to your system. 

Firms Mentioned in this Column

XComp
3554 Ruffin Rd., South
San Diego, CA 92123
(619) 573-0077

Quadram
4355 International Blvd.
Norcross, GA 30093
(404) 923-6666

SirTech
6 Main St.
Ogdensburg, NY 13669
(315) 393-6633

Modula Computer Systems
950 N. University Ave.
Provo, UT 84604
(801) 377-3598

Awareco
38401 S. Highway One
Box 695
Gualala, CA 95445
(707) 884-4019

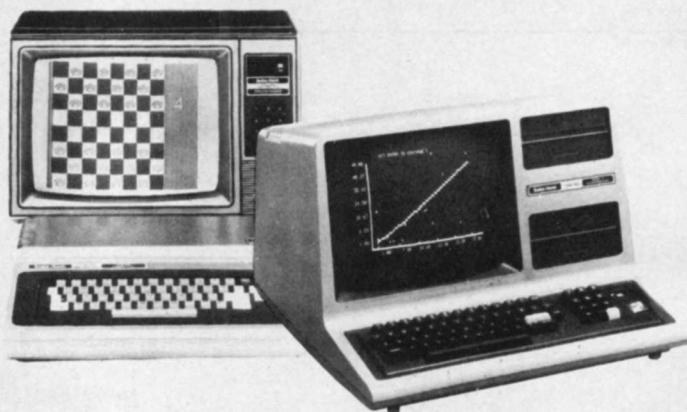
Digital Research
P.O. Box 579
Pacific Grove, CA 93950
(408) 649-3896

Apparat, Inc.
4401 South Tamarac Pkwy.
Denver, CO 80237
(303) 741-1778

Courtrin Enterprises
P.O. Box 231190
San Diego, CA 92123
(619) 569-8308

SuperSet Software
P.O. Box 1036
Orem, UT 84057
(801) 226-2572

A Printer and other new products for Radio Shack Computers



TRS-80 Strings

As the speedometer of our Tandy Special reaches the 65 mark, we see on the superhighway ahead of us the TRS-80 video cassettes, SCM's Ultrasonic Messenger III electronic typewriter/printer, the Add-A-Voice program from H.I.B., and another short program that creates twinkling stars.

TRS-80 Video Cassettes

At your local Radio Shack Computer Center or Computer Department, you may have noticed, over in a corner near a TV set, a VHS video cassette player and a dozen video cassettes. Perhaps you've even looked at the titles: *Scriptit* Seminar, Accounting Software Seminar, *VisiCalc* Software Seminar, A Day in the Life of the Model 100, *Agristar*, *Profile Plus*, Legal Software Seminar, *Multiplan*, etc. Each is 10 to 20 minutes long.

These aren't tutorials; they're commercials covering the basic features of the products. These sales tools are played at the Radio Shack seminars offered on various software packages to help encourage the attendees to buy the product. They're also used occasionally by Computer Center personnel to familiarize themselves with various products (for such people there are also special tapes on selling techniques).

The tapes are professionally made and resemble top-flight extended TV commercials. They all have the same beginning: a long introduction that discusses Radio Shack, "the largest chain of retail stores in the world," the Computer Center concept, the TRS-80, etc. Then the tape examines the main features of the software package.

The tapes usually blend mini-dramas with show-and-tell. "The *Scriptit* Dif-

Stephen B. Gray

ference" tape, for example, shows a harassed secretary whose boss wants a complicated report revised (and re-revised) by noon. We see brief segments of this continuing saga between descriptions of *Scriptit* features, showing (with close-ups) how they look on the screen; what kind of documents can be created with *Scriptit*; how to prepare a document, make corrections, move or delete phrases or sentences; do a global search and replace; use spelling checkers, hyphenation and page numbering; handle printing formats; use *Scriptit* with accounting and other packages; etc.

Several *Scriptit* users give testimonials. Several TRS-80 models are de-

scribed, including the II, 16, 4, and 12, and also *Superscriptit*. Some prices are given.

The tape ends with the boss promising his secretary that if she retypes the report just one more time, he'll look into Radio Shack's TRS-80 and *Scriptit*.

These tapes are in every Radio Shack Computer Center and in some Computer Departments. They are excellent sales tools, designed to show the basics of how the product works, its advantages, what it runs on, and how much it costs. If you attend a software seminar, you may have a chance to see one of these fine commercials.

SCM Ultrasonic III Typewriter/Printer

The print mechanism used in the Smith-Corona L-1000 daisywheel



Figure 1. The SCM Ultrasonic Messenger III portable typewriter can also be used as a computer printer: ten printwheels are available in three pitches.

printer, reviewed here in the previous issue, is also used in several SCM electronic typewriters.

The SCM Ultrasonic III Messenger (Figure 1) is a portable (22-pound) model that doubles as a computer printer and offers electronic features such as full-line memory correction, triple pitch selection (10, 12, 15 cpi), and automatic underlining and centering. Combined with its optional Messenger Module, the typewriter becomes a letter quality daisywheel computer printer. The typewriter has a suggested list price of \$635 (it is available in New York for under \$440); the Messenger Module is \$170 (available for less than \$150).

Typewriter

To use the SCM Ultrasonic III as a typewriter, just slide the pitch selector to the setting appropriate for the printwheel used, insert paper, and start typing.

The three pitches are pica (10 characters per inch), elite (12 cpi), and micro (15 cpi). A different look can be achieved by using a 12-pitch printwheel at 10 pitch ("to provide an exceptionally attractive open styling," as a brochure puts it) or a 15-pitch printwheel in 10- or 12-pitch settings.

All L-1000 printwheels fit the typewriter, and vice versa, since the print mechanism is the same in both, with one difference: the typewriter has an error-correction tape.

Several printwheels are available for each pitch; at least two are designed to be used at either 10 or 12 cpi. The one for computer use is the ASCII Tempo 10/12 wheel, which includes characters not found on the other wheels (Figure 2).

Tempo 10 is a 10-cpi non-ASCII printwheel with characters a little different from the ASCII Tempo 10/12. Regency 10 is a modern version of standard pica.

Printwheels are easily changed. Just remove the ribbon cassette, move the print hammer back from the printwheel,

pull the printwheel off its spindle, and reverse the process with another printwheel. All this can be easily done in less than 15 seconds.

Ribbons

All three of the ribbons designed for the L-1000 printer can be used on the Ultrasonic III typewriter: reusable fabric (nylon) ribbon and one-time multistrike and single-strike mylar film ribbons.

In addition, the SCM electronic typewriters use Lift-Rite film ribbons, which have a different chemical formulation than the mylar printer ribbons. Lift-Rite prints characters that can be lifted right off the paper with Lift-Rite correction tape.

The Ultrasonic III has a memory that holds a full line of characters and will automatically correct any or all of them. To backspace and erase (lift off) characters simultaneously, just press the CORRECT key all the way down, and hold it until all the wrong ones have been deleted. Then type in the correct characters.

Preset Mode

When the typewriter is first turned on, a PRESET light turns on at the top left of the keyboard. This indicates that the margins and tabs are pre-defined, at

settings that depend on which pitch has been selected.

For example, at 10 pitch the left margin is at 12, the first tab at 17 (standard paragraph indent), second tab at 42 (center of the writing line), third tab at 52 (signature position), and right margin at 72. At 15 pitch those settings are 18, 25, 63, 78, and 108.

All these settings are easily changed using the LEFT MARGIN, RIGHT MARGIN, TAB CLEAR, TAB SET, and MARGIN RELEASE keys. Change any setting, and the PROGRAMMED light turns on instead of the PRESET light, to let you know which mode you are in.

As an electronic typewriter, the SCM Ultrasonic Messenger is fine; I've been using it for several months and like it very much. However, I'd like to see several changes in a future model:

- When you turn the power off, the typewriter returns to the preset margins and tabs. If TV sets can remember the previous station setting while turned off, why couldn't an electronic typewriter? That way, you wouldn't have to keep reprogramming margins and tabs to often-used settings every time the machine is turned on.

- The margin release seems to be mechanical; that is, it doesn't release unless you press the key when the

"Pictures like this are easy using a joystick and FLYING COLORS.™"

— Dickie Mitchell, Age 9

You'd be amazed to see how fast Dickie can create one of these computer pictures using just a joystick (not an expensive tablet) and FLYING COLORS software.

The speed comes from the ability to draw elastic lines and make automatic rectangles and circles. Presto. Erase. Zip. Fill an entire area with color or patterns. And you can even type in labels or text too. Micro mode lets you do the most exacting detail.

Dickie uses the "Slide Projector" feature to create whole shows, and of course, he can save the pictures on disk for later use.

FLYING COLORS. It's a snap. For Apple or the Commodore 64.

At your dealer's now or call toll free (800) 874-1888. In California call (415) 331-3022. **\$39.95***

*Also available with automatic printout routines for \$69.95.

Another creation from the Computer Colorworks.



FLYING COLORS™
COMPUTER GRAPHICS SOFTWARE

The ASCII TEMPO 10/12 at 10 cpi: < > ^ \ | and many other signs. Same: 12 letters an inch. Again: 15 letters to the inch. Tempo 10 is the non-ASCII 10-pitch wheel. Regency 10 is a modern pica style.

Figure 2. These are only three of the ten typefaces available for the SCM Ultrasonic Messenger typewriter.

CIRCLE 184 ON READER SERVICE CARD

NEW from *Creative Computing Press*—

Three great books for Apple, Atari and TRS-80 owners!

Creative Computing has just produced the books you've been waiting for—the most informative, challenging and stimulating volumes yet written for the Apple®, Atari®, or TRS-80® owner!

THE CREATIVE APPLE

brings you 450 pages of the best articles and features on the Apple to appear in the past four years of *Creative Computing*. Revised and updated, this wealth of material gives you dozens of ways to tap the tremendous potential of your Apple, with information-packed chapters on:

- Graphics • Music • Education • Word Processing • Business • Applecarts
- Software Reviews • Programs—Ready to Run • Tips for Easier Programming • Branches

Whether you use your Apple for business, teaching, home budgeting or just having fun, you'll find plenty of ways here to get more out of it than you ever dreamed!

THE CREATIVE APPLE, edited by Mark Pelczarski and Joe Tate. 8½" x 11", softcover, illustrated. **\$15.95.**

THE CREATIVE ATARI is an invaluable guide for the average, non-expert user who knows a little about BASIC and simple programming. The Atari is one of the most sophisticated consumer graphics devices ever invented. Yet, because it is so powerful, learning how to use its special features can be difficult for all but the most skilled programmers. Here's where **THE CREATIVE ATARI** can help. Taking articles, columns and tutorials that previously appeared in *Creative Computing*, the authors have updated the material for maximum learning ease. **THE CREATIVE ATARI** contains four main sections:

- An introduction, with a discussion of Atari memory concepts essential to programming.
- A tutorial on Atari graphics.
- A collection of programming tips, plus information on non-graphics areas.
- Programs you can type in yourself, with reviews of other good commercial programs available for the Atari.

You'll also find an Appendix with a reference guide to useful Atari information. Whether you're a long-time Atari owner or are just thinking about getting one, this is *the* book to have!

THE CREATIVE ATARI, edited by D. Small, S. Small and G. Blank. 8½" x 11", softcover, illustrated. **\$15.95.**

THE CREATIVE TRS-80 is a complete guide based on articles that appeared in *Creative Computing*, covering everything from games to business applications for the TRS-80. Chapters include:

- Games, with nine full-length listings you can type directly into your computer.
- Personal Productivity, with discussions on expense management, record keeping and other packages.
- Education, detailing uses for pre-school, elementary and high school students.
- Business, and making the most of investment opportunities.
- Word Processing, covering Scripsit, LazyWriter and more.
- Programming Tips, Suggestions on structured programming, debugging, error trapping and numerical techniques.



- Graphics, with advice from experts on how to enhance your programming capabilities.
- TRS-80 Strings—reprints of this monthly *Creative Computing* column.
- Software, and overview of commercial software ranging from chess to improving your computer's language capabilities.
- Hardware, including discussions on new models, printers and other peripherals.

Your TRS-80 is a wonderful tool for learning, having fun, and improving the quality of your life. With **THE CREATIVE TRS-80**, you'll expand the uses of your machine—and its value to you—in a hundred new and exciting ways!

THE CREATIVE TRS-80, edited by Ken Mazur. 8½" x 11", softcover, illustrated. **\$15.95.**

Registered Trademarks: Apple: Apple Computer Inc.; Atari: Atari Inc.; TRS-80: Radio Shack Division of Tandy Corp.

For faster service

PHONE TOLL FREE: 800-631-8112
(In NJ call 201-540-0445.)

CREATIVE COMPUTING PRESS, Dept. ME1F, 39 East Hanover Ave. Morris Plains, NJ 07950

CREATIVE APPLE: Send me _____ copies at \$15.95 each* plus \$2 postage and handling. #18R

CREATIVE ATARI: send me _____ copies at \$15.95 each* plus \$2 postage and handling. #18B

CREATIVE TRS-80: Send me _____ copies at \$15.95 each* plus \$2 postage and handling. #18Y

*CA, NJ and NY State residents add applicable sales tax. Outside USA add \$3 postage and handling charge.

CHECK ONE:

☐ **PAYMENT ENCLOSED \$** _____

☐ **CHARGE MY:** ☐ American Express ☐ MasterCard ☐ Visa

Card No. _____ Exp. Date _____

Signature _____

Mr./Mrs./Ms. _____
(please print full name)

Address _____ Apt. _____

City _____ State _____ Zip _____

☐ Check here for FREE *Creative Computing* Catalog.

Available at your local bookstore or computer store.

TRS-80 Strings, continued...

printhead is exactly at the end of the line. I'd like the key to release the margin no matter where the printhead is, so when you're typing and get the end-of-line beep (five spaces before the end of the line), you can hit the MARGIN RELEASE key and keep on going. As it is, you have to wait until you're at the end of the line for the key to be effective.

Enhanced Typewriter Features

Most electronic typewriters offer features not found on standard electric models. The Ultrasonic has a nice variety of such enhancements, activated by pressing the CODE key and a number key from 1 to 0.

Auto Return returns the carrier to the left margin at the end of each typed line.

Auto Center centers text between the margins currently in use.

Auto Underscore underlines words but not the spaces between, on Code 5; all word and spaces are underlined on Code 6.

Tab Center centers typed text over a particular tab stop.

Decimal Tab allows you to do statistical typing; all numbers are aligned on their decimal points.

Flush Right aligns text evenly to the left of a particular tab stop.

Printer

If you have an SCM Ultrasonic typewriter, it can be upgraded to be used as a printer like the Messenger model. Either way, you need the Messenger Module between your computer and the typewriter. Although the L-1000 prints in both directions, the typewriter is unidirectional.

The SCM Messenger Module (Figure 3) measures 1.8 x 6 x 8.8 inches and weighs 2.5 pounds. It has both RS-232C serial and Centronics-compatible parallel interfaces; the serial interface has both hardware and software handshake protocols. You'll need an interface cable; I use the parallel 26-1401 cable with the Model I/III/4.

Press the CODE key and letter P, and the typewriter goes into printer mode. The left and right margins are set to their extreme positions, and all tabs are cleared; margins and tabs are now under computer control, as is pitch.

Controls that were operated from the keyboard in typewriter mode are set from Basic CHR\$() statements in printer mode using the same software codes as the L-1000 printer. For example, setting pitch via software requires three CHR\$() codes: CHR\$(27) for ESC, CHR\$(31) for setting pitch, and CHR\$(12 or 10 or 8) for pitches 10, 12 or 15 cpi, respectively.

By using CODE-P again while in printer mode, you can get back into



Figure 3. The SCM Messenger Module contains serial and parallel interfaces, and DIP switches for controlling various features.

typewriter mode whenever you need to insert text manually, such as a name and address on a form letter.

Inside the Messenger Module are the same 14 DIP switches as in the L-1000 printer, to control features such as character length, parity, baud rate, and whether or not a carriage return is to be accompanied by an automatic linefeed. For the TRS-80, all you need do is turn on that last one, or else the paper will never space up.

By the way, the "Ultrasonic" in the name isn't just there because it sounds futuristic. The typewriter actually operates by sending high-pitched sounds

from the keyboard to the print mechanism, thus eliminating all mechanical and electronic linkages between the two. This simplifies design and manufacture.

Ultrasonic III Lookalikes

The SCM Ultrasonic III Messenger typewriter was designed to be sold by office equipment and typewriter dealers. Two similar typewriters, with almost the same features and slightly varying prices, are also offered, tailored to specific markets. The Citation III is designed for department stores and the Memory Correct III for mass merchandisers and catalog houses. Both are available in Messenger models; add the optional Messenger Module to either and you have a computer printer.

As an example, the Citation III Messenger is \$24 less (in suggested retail price) than the Ultrasonic III Messenger; it lacks automatic underlining and several tab features (Tab Center, Decimal Tab, Flush Right) found in the latter.

Changes I'd Like to See

There are several printer-type things I'd like to see changed for the Ultrasonic IV, or whatever the next model will be called:

- Put rollers on the paper bail, as on

"I made homework fun using a joystick and FLYING COLORS.™"

— Katherine Mitchell, Age 11

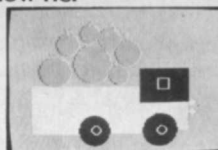
You're looking at the title page for "The Littlest Pumpkin", an original story with pictures that Katherine did for school.

First she drew the pictures with a joystick and FLYING COLORS. That was easy because she could use elastic lines and automatic rectangles and circles. Presto. Then fill in with patterns or vivid colors. She used Alpha Mode to type in labels and text.

When she was all done she used the "Slide Projector" feature to put the words and pictures together in storybook form to show her teacher.

Katherine used an Apple but FLYING COLORS works on the Commodore 64 too.

FLYING COLORS™
COMPUTER GRAPHICS SOFTWARE



At your dealer's now or call
toll free (800) 874-1888.
In California call (415) 331-3022.

\$39.95*

*Also available with automatic
printout routines for \$69.95.

Another creation from the Computer Colorworks.

TRS-80 Strings, continued...

the L-1000; without them, in printer mode, the paper can get all messed up.

- Include information regarding which line at the top of a page the printing will start on. As it is, much paper can be wasted figuring this out.

Even without these changes, the SCM Ultrasonic III Messenger is an excellent typewriter and a fine printer; both provide printing you'll be proud of.

Add-A-Voice

Add-A-Voice is a machine language utility from H.I.B. that lets you add voice output to any Basic program for a TRS-80 Color Computer with 16K or more of memory (Extended Basic is not required).

Human speech was used to create 25 words, which were digitally recorded and then written on tape, for reading into memory. This lets you create voice

Only two simple commands are needed to select and generate a spoken word from your TV speaker.

output at any time in the program, using any combination of the stored words. Only two simple commands are needed to select and generate a spoken word from your TV speaker.

Two sets of words are provided to be used one set at a time. The Game Set has 13 words: win, lose, I, you, go, hit, got, me, stop, help, missed, oh, heh (laugh). The Quiz Set has 12 words: you, yes, no, good, sorry, are, right, wrong, try, again, a, winner.

The entire *Add-A-Voice* program, including one of the word sets and the driver program, uses 4K of memory.

Generating Voice Output

To generate a voice output, use these two Basic statements in your program:

POKE 15694, X

G=USR(1)

where X is a decimal between 0 and 12 that indicates the word to be generated. WIN is word 0 in the Game Set; WINNER is word 11 in the Quiz Set.

To change the pitch of the voice, use POKE 15987, X

where X is a decimal number between 1 and 20 with 11 being the normal pitch.

The typed five-page manual (two pages are program listings) says you can add a filter to the program, "to smooth the voice." The sound is just about the

same with or without a filter, resembling a voice transmitted from a million miles in space, surrounded by white noise. However, it is recognizable, especially after you become familiar with the short list of words.

Add-A-Voice Demos

Two demonstration programs are provided, one for each word set. The Quiz Set demo asks you to add numbers, such as:

6 + 3 =

and if you answer 9, you'll hear

GOOD, RIGHT AGAIN

or

YOU ARE A WINNER

or

YES, YOU ARE RIGHT

or

YES, YES, YES.

Enter a wrong answer, and you'll hear

NO, YOU ARE WRONG

or

SORRY, TRY AGAIN.

The stored words include enough blank space after each so that when several are used in a phrase, they don't run together.

Run the Game Set demo, and first you'll be asked to specify a voice pitch (6 is high, 15 is low), and to turn the filter on or off. Then enter a number between 1 and 5, and a voice says a few words at the same time the words are shown on the screen, to demonstrate phrases that might be used in games, such as:

YOU WIN—I LOSE

or

OH! OH! STOP! HELP!

or

I MISSED YOU

or

I GOT YOU, HEH-HEH

or

YOU HIT ME.

That's all there is to it, except for two "Tips to conserve memory in your Basic program," the second of which is: Use a DATA statement to specify the number of each word in a phrase, like this: DATA 1,5,7,4,9. Then READ these numbers and POKE them into memory to generate a voice output.

Complete listings of the two demo programs are provided to show how simple it is to add voice to a Basic program.

Add-A-Voice is \$14.95, plus \$1 for shipping and handling, from H.I.B. Specify 16K or 32K.

Short Program 49: Twinkle 2

The November 1983 column ended with a short program (p. 330) that cre-

ates the effect of twinkling stars. But not quite, so readers were asked if they could improve on the original program. Many sent in responses; the better ones will be reprinted here. One at a time, that is, so as not to bore you with all that twinkling.

Fred Burggraf of Port Tobacco, MD, has a straightforward approach:

```
100 RANDOM
110 DIM A(100), B(100)
120 CLS
130 FOR Z=1 TO 100
140 A(Z) = RND(127)
150 B(Z) = RND(47)
160 SET(A(Z),B(Z))
170 NEXT
180 Z=RND(98)+1
190 RESET(A(Z),B(Z))
200 RESET(A(Z+1),B(Z+1))
210 RESET(A(Z-1),B(Z-1))
220 FOR ZZ=1 TO 20: NEXT
230 SET(A(Z),B(Z))
240 SET(A(Z+1),B(Z+1))
250 SET(A(Z-1),B(Z-1))
260 GOTO 180
```

This clever adaptation and expansion of the original uses twin arrays (110) to turn on 100 pixels (stars)(130-170) in random locations across the sky (screen). Then it randomly resets a star (190) along with two others: the stars to the immediate southeast (200) and northwest (210); that is, if there are stars in those three locations. After a slight delay (220) to provide a more realistic twinkle than a fast off-and-on, these three stars (actually, from zero to three stars) are turned on again (230-250). Line 260 recycles the program, to continue the twinkle process among the 100 stars in this fixed TRS-80 firmament.

Because not many stars in this display are accompanied by immediate SE/NW companions, almost the same effect can be achieved without lines 200-210 and 240-250. However, the delay in line 220 should then be increased to 40 from 20 to make up for the delay provided by the eliminated lines.

For more twinkle programs, stay tuned to this station.

Firms Mentioned in this Column

H.I.B.

3505 Hutch Pl.

Chevy Chase, MD 20815

Smith-Corona Corporation

65 Locust Ave.

New Canaan, CT 06840

(203) 972-1471

creative computing CLASSIFIED

CLASSIFIED RATES: Per Word, 15 Word Minimum. **REGULAR:** \$3.50. **EXPAND-AD®:** \$5.25. Ads set in all bold type at 20% premium. Ads set with background screen @ 25% premium. **GENERAL INFORMATION:** Prepayment discounts available. Payment must accompany order except credit card—Am. Ex., Diners, MC, VISA (include exp. date)—or accredited ad agency insertions. Copy subject to publisher's approval; must be typewritten or printed. First word set in caps. Advertisers using P.O. Boxes MUST supply permanent address and telephone number. Orders not acknowledged. They will appear in next available issue after receipt. Closing date: 5th of the 3rd month preceding cover date (e.g., April issue closes Jan. 5th). Send order & remittance to: Classified Advertising, **CREATIVE COMPUTING Magazine**, 1 Park Avenue, New York, N.Y. 10016. To charge your ad to a major credit card, call Lois Price at (212) 725-7226. For Customer Service, call (212) 725-4312.

SOFTWARE

TI-99/4A PROGRAMMERS: Affordable Software!
Catalog, only \$1. **PROGRAMS SOFTWARE, 1435 Burnley Square North, Columbus, OH 43229.**

TI 99/4A SOFTWARE. Free price list plus newsletter. Glen Dobbs, Box 801CC-1, Santa Maria, CA 93456.

FREE EDUCATIONAL SOFTWARE CATALOG—Pet, Commodore 64, Apple II+, TRS-80—Island Software, PO Box 300, Dept. G, Lake Grove, NY 11755. (516) 585-3755.

ATTENTION APPLE, IBM, Commodore, Atari, TI 99/4A users. Extensive selection of software. Send for catalog, specify model. Celjim Enterprises, 3687 Mexico, Westerville, Ohio, 43081. (614) 890-7725 after 4:30.

TI99/4A KENO and many more. Send SASE to A.T. Enterprises, 1391 Carr Ave., Aromas, CA 95004.

TI/99 4A OWNERS: Wide variety of original software. For free catalog write to: Rodan Computing, Box 77, Emory, VA 24327. (703) 944-5896.

TS/1000, ZX/81, TI99/4A, VIC-20 Software. Send for **FREE** catalog: Midwest Software, 9922 Harwich, Crestwood, MO 63126.

HANDICAPPING PROGRAMS FOR MOST PERSONAL COMPUTERS. Free Catalog: Gambler's Edge Computing, Dept B4, 250 Richards Rd., Ste. 254, Kansas City, MO 64116.

HARNESS AND THOROUGHbred RACING HANDICAPPING PACKAGE ... \$31.95. Specify: Cassette, Diskette, Apple II+, IBM PC, COMMODORE 64, VIC 20, Atari, TI-99/4A, TRS-80, **FREE INFORMATION!** SOFTWARE EXCHANGE. Box 5382 West Bloomfield, Michigan 48033.

TI—99/4C-64, TIMEX/SINCLAIR, VIC OWNERS. 5 fun programs for \$2! Get Baseball, Etching—Sketch, Blackjack, Dungeon, Galactic Patrol. Specify your computer. Chipmunk Software 634 Littlecroft, Upper Darby Penn. 19082.

TI-99/4A OWNERS. Get your free catalog of new, exciting low cost software. DYNAMO, Box 690, Hicksville, NY 11801.

MC10 HIGH RESOLUTION WITH NO HARDWARE MODIFICATIONS. Cassette programs let you draw 18000 pixel (256x78) color pictures, and SAVE them. Full documentation 2 cassettes \$16.85. Send check or M.O. to RAM BAM ART & GAMES, 617 Constitution Dr., Orlando, FL 32809.

LOTTERY, statistical analysis of state lotteries. Best bets, daily/weekly. Apple. Hardin Inds., P.O. Box 611, Manville, NJ 08835.

FREE Commodore—64/TI99-4A/VIC-20/TRS80-coco/ Timex programs! Send stamps! EZRAEZA Company, Box 5222-RJ, San Diego, California 92105.

CRYSTAL COAST SOFTWARE: educational, entertaining, practical programs. ATARI, TI, TIMEX/SINCLAIR. **FREE** catalog, program listings: POB 233, Moorehead, NC 28557.

CUSTOM WORDSTAR: Patches for Gemini, Epson, Prowriter, Okidata printers, get condensed, enlarged characters, super/subscript, underlining and more. Instructions: \$10.95. We install: \$29.95 (with PRINT-MODE Program). LAI, POB 13118 Dinkytown, Minneapolis, MN 55414, SASE.

LADDER™ PLAYERS! Improve scores, create your own screens, with a new KAYPRO X. Order HINT™ from Softies Software. \$19.95 to P.O. Box 6658-C, Arlington, VA 22206. Specify Computer system.

TI-99/4A Owners: Get your free catalog of new, exciting, low cost software. Dynamo, Box, 690, Hicksville, NY 11801.

COMMODORE 64/VIC 20 Games/educational software. Over 400 titles! Write for **FREE** catalog! American Peripherals, 122 Bangor St., Lindenhurst, NY 11757.

HARDWARE

TI99 Printer Interfaces & 32K RAM expansions. No box needed. From \$125.00. COMPRINT, (614) 349-8448.

48K APPLE COMPATIBLE computer; U.S. \$380.00 and hundreds of programs. Details U.S. \$1.00. Reliant, PO Box 33610, Sheungwang, Hong Kong.

COMPUTER EQUIPMENT/SUPPLIES

FREE 64-PAGE COMPUTER catalog crammed full of thousands of the best buys and lowest prices around! A.P. Computer Products, Dept. CC, 214A East Main, Patchogue, N.Y. 11772. (516) 698-8636.

COMPUTER PAPER—SAVE \$\$\$—Top quality. Fast shipping. Low single-carton prices. Super quantity discounts. Call A-1, (800) 628-8736 or (213) 804-1270.

SURGE-SPIKE PROTECTOR. 6 outlet. Send \$24.95 to DKP, P.O. Box 2421, Ann Arbor, MI 48106.

BARGAIN PRICES on computer error merchandise. Video games with both controls moving left player; right player is stationary on screen, only \$9. WOM (Write Only Memory) chips in 13-pin DIP mounts. Good to use with obsolete or unwanted data, 42 cents. Write T.E. Sales, Dallas, TX.

PRICES slashed on computer error merchandise. AND gate chips that act as DON'T gates; regardless of input, output is always 0 volts. Seven-bit microprocessors. Much better than 4-bit mpus; almost as good as 8 bits, \$2.50. Write CE Sales, Ely, NV.

FREE catalog—full of the best computer accessories at the lowest prices. Write: TEMCC6, 10-12 Charles St, Glen Cove, NY 15442.

COMPUTER PUBLICATIONS

"DISK DRIVE MANUAL"—Drive Alignment, Speed Adjustment, Maintenance, Repair without special software equipment. Comprehensive, \$15,000+ words. \$20. Brochure \$1. CONSUMER-TRONICS, 2011 Crescent, Alamogordo, NM 88310.

MICRO MOONLIGHTER NEWSLETTER—our third year of home computer business resources! Sample \$3.00. Dept. CE, 4121 Buckthorn Court, Lewisville, TX 75028.

CHRISTIAN COMPUTING MAGAZINE. Bimonthly subscription \$12. Single issue \$3.72 Valley Hill, Stockbridge, Georgia 30281.

BUSINESS OPPORTUNITIES

START YOUR OWN Microcomputer based mail order business. Free info. Bork Research, POB 317-CC Hershey Pa 17033.

LAST week to send me your dollar! Offer ends soon, so act now and avoid lawsuits. Send to Mr. A. Swindel, 22 Maiden Lane, NYC.

PROGRAMMERS, WE WILL HELP YOU FIND A SOFTWARE PUBLISHER FREE. We represent publishers looking for programs of all types. **SOFTWARESEARCH, Inc.** P.O. Box 281, Budd Lake, N.J. 07828. (201) 627-1790.

CREATIVE PROGRAMMING OPPORTUNITY Innovative software company seeks experienced assembly and C language programmers. (6502 preferred) interested in creative applications including graphics, animation, music/sound effects, artificial intelligence, simulations, and robotics. Join the people who wrote paint and moviemaker and participate in our growth. Send resume to: **INTERACTIVE PICTURE SYSTEMS** c/o James Ehlers 2004 Spring Garden Street Philadelphia PA 19130.

GAMES

SUPER STAR TREK. Not copy protected! You've seen it on mainframes! All the thrills of the original Star Trek plus: Romulans equipped with cloaking devices, Klingon Commanders with tractor beams, orbit planets, mine dilithium crystals, launch probes, defend starbases, five play levels and much more! Only \$19.95. Commodore 64, Apple. SoftTrek Enterprises, 3646 Fieldcrest Dr., Garland, TX 75042.

COMMODORE 64

ARCADE ACTION—MOVIE THRILLS—"Lightcycles", futuristic motorcycle chase-fast machine language for Commodore 64 on Disk or cassette. Send \$15.95 to UNICORN Box 7L, Grays Summit, MO 63039.

COMMODORE/VIC-20 bargains. Programs, supplies, peripherals, battery backup, game accessories, hardware. Free catalog. Creative PO 4253, Thousand Oaks, CA 91360.

BASEBALL/SOFTBALL STATISTICS REPORTING. Professional record keeping for team and/or league. Cassette \$29.95. Data Management, 12 Fairlawn Drive, Castleton, NY 12033.

COMMODORE 64/V-20 CASSETTE ADAPTER. Use regular recorder instead of Datasette. Loads datasette programs and copies even protected cassettes. 60 day warranty. \$29.95 + \$1.50 s/h. Ohio add 5% Tax. Free literature! BDMicro, Box 6294, Canton, Ohio 44706.

FOR SALE/BARTER

LOWEST POSSIBLE PRICES ANYWHERE! Computers Hardware—Software—Printers, Audio, Video, Car Stereo. **ELECTRIFIED DISCOUNTERS**, 996 Orange Ave., West Haven, CT 06576 MC/VISA. (203) 937-0106.

MAILING LISTS

COMPUTER SHOW ATTENDEES N.Y., N.J.: 15,000 names. \$30/M. P/S labels. For info, (201) 297-2526.

SERVICES

SHOP AT HOME! Use your modem to call Fantasy Plaza. Free Electronic Shopping at (818) 840-8066.

USERS GROUPS

FREE VIC-20 and COMMODORE 64 USERS GROUP MEMBERSHIP with software purchase. Why pay to belong to a users group when you don't have to? Benefits: Newsletter, extensive club library, discounts, contests, questions hot-line and more! Free details—(803) 797-1533. Lords of Basic, PO Box 459, Dept. 103, Ladson, SC 29456.

CREATIVE PROGRAMMING custom tailored for your PC. Reasonable rates. Contact: Fred Frabotta, Micro Magic, 111 Francis Ave., Shrewsbury, MA 01545. (617) 845-1962.

INSTRUCTIONS

Double diskette capacity on single side 5¼ single or double density disk. Complete instructions \$3.00. Nothing else to buy. Disk Cost Reduction, 2803 W. 18th, Plainview, TX, 79072. (806) 293-5650.

WANTED

Inventions, ideas, new products wanted! Industry presentation/national exhibition. Call free 1(800) 526-6050. Arizona, 1(800) 352-0458. X831.

creative computing's RETAIL ROSTER

A DIRECTORY OF STORES AND THE PRODUCTS THEY CARRY
TO PLACE A LISTING CALL COLLECT: LOIS PRICE (212) 725-4215

ARIZONA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals.

CALIFORNIA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. ANAHEIM—330 E. Ball Rd., (714) 776-9420. CAMPBELL—2350 S. Bascom Ave., (408) 377-8920. EL CERRITO—6000 Potrero Ave., (415) 236-8870. LA MESA—8363 Center Drive, (714) 461-0110. LOS ANGELES—2309 S. Flower St., (213) 749-0261. POMONA—1555 N. Orange Grove Ave., (714) 623-3543. REDWOOD CITY—2001 Middlefield Rd., (415) 365-8155. SACRAMENTO—1860 Fulton Ave., (916) 486-1575. WOODLAND HILLS—22504 Ventura Blvd., (213) 883-0531.

COLORADO

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. DENVER—5940 W. 38th Ave., (303) 422-3408.

CONNECTICUT

EXECUTIVE SOFTWARE—Stamford—(203) 359-2604. Dedicated to excellence in microcomputers! Authorized dealer for KAYPRO & ALTOS.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. AVON—395 W. Main St. (Rt. 44), (203) 678-0323.

FLORIDA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. HIALEAH—4705 W. 16th Ave., (305) 823-2280. JACKSONVILLE—8262 Arlington Expressway, (904) 725-4554. PLANTATION—7173 W. Broward Blvd., (305) 791-7300. TAMPA—4109 Hillsborough Ave., (813) 886-2541. FT. LAUDERDALE—7173 W. Broward Blvd., (305) 791-7300.

GEORGIA

MENTOR TECHNOLOGY, 395A Pleasantdale Road, Atlanta, 30340. (404) 447-6236. Televideo, Eagle, OSM, Prowriter, Morrow, Business Software. Multi user specialists!

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. ATLANTA—5285 Roswell Rd., (404) 252-4341.

HAWAII

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. HONOLULU—98-1254 Kaahumanu St., Pearl City, (808) 487-0029.

ILLINOIS

VIDEO ETC., 465 Lake Cook Plaza, DEERFIELD, 60015, (312) 498-9669. Other locations: SKOKIE (312) 675-3655, ORLAND PARK (312) 460-8980, BUFFALO GROVE, (312) 459-6677, strong Hard/Software support for Apple, Atari, Kay Pro, IBM-PC

LOMBARD—COMPLETE COMPUTING, 890 E. Roosevelt, (312) 620-0808. Kaypro, Eagle, Victor, Atari, Commodore 64, Great Software Selection! Service/Training.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. Chicago—3462-66 W. Devon Ave., (312) 583-3920. DOWNERS GROVE—224 Ogden Ave., (312) 852-1304.

INDIANA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. INDIANAPOLIS—2112 E. 62nd St., (317) 257-4321.

KANSAS

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. MISSION—5960 Lamar Ave., (913) 362-4486.

KENTUCKY

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. Louisville—12401 Shelbyville Road, (502) 245-7811.

LOUISIANA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. KENNER—1900 Veterans, Memorial Hwy., (504) 467-6321.

MARYLAND

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. BALTIMORE—1713 E. Joppa Rd., (301) 661-4446. ROCKVILLE—5542 Nicholson Lane, (301) 881-5420.

MASSACHUSETTS

SCIENCE FANTASY BOOKSTORE 18 Eliot, Harvard Square, Cambridge, 02138. (617) 547-5917. Open 11-6. Apple, Atari, IBM, Commodore 64.

MICROCON COMPUTER & SOFTWARE center, Danvers. Wide selection of products and services for Apple, Atari, Color Computer, CP/M & MS DOS systems, and Commodore computers. Software, hardware, accessories, peripherals, books & magazines. (617) 777-6440.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. PEABODY—242 Andover St., (617) 531-9330. WELLESLEY—165 Worcester Ave., (617) 237-1510.

MICHIGAN

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. E. DETROIT—18149 E. Eight Mile Road, (313) 772-0416. FARMINGTON HILLS—29433 Orchard Lake Road, (313) 555-4171.

MINNESOTA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. HOPKINS—101 Shady Oak Road (612) 938-6371. ST. PAUL—1645 White Bear Ave. (612) 778-1211.

MISSOURI

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. ST. LOUIS—3794 McKelvey Road (314) 291-1850.

NEBRASKA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. OMAHA—9207 Maple St., (402) 391-2071.

NEW HAMPSHIRE

VIDEO STORE—140 Congress, Portsmouth 03801. (603) 431-1211. Osborne and Epson QX-10 for your business/home. Software. Supplies.

COMPUTER HUT of New England—101 Elm, Nashua, 03060. (603) 889-6317. Retail-Mailorder DISCOUNT HOUSE for all your personal computing needs.

WAYNE SOFTWARE—1459 Route #23, Wayne 07470. (Across from Packanack Center) Books, Programs, Discount Prices! (201) 628-7318.

UNION SOFTWARE OUTLET, 2183 Morris Ave., Union, NJ 07083. (201) 964-8555. Large selection of software! 20% lower than national retail prices! Eagle dealer.

NEW YORK

ALPHA STEREO—345 Cornelia Street, Plattsburgh 12901, (518) 561-2822. Atari computers and software. Weekdays 10-8, Sat. 10-6, Sun. 12-5.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. AMHERST—3476 Sheridan Dr., (716) 835-3090. ROCHESTER—937 Jefferson Rd., (716) 424-2560. N. WHITE PLAINS—7 Reservoir Rd., (914) 761-7690. Jericho, L.I.—15 Jericho Turnpike, (516) 334-8181.

NORTH CAROLINA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. GREENSBORO—4820 W. Market St., (919) 299-5390.

OHIO

ABACUS II—1417 Bernath Pkwy., TOLEDO 43615; (419) 865-1009. 4751 Monroe St. (419) 471-0082. 10-6, 10-9 Thursdays. IBM-PC, Epson, Apple, Osborne, Lisa.

NORTH COAST COMPUTERS, 650 Dover Center, Bay Village 44140, 216-835-4345. 100 N. Main, Chagrin Falls. Apple, Lisa, Vector Graphics, Hewlett-Packard. (216) 247-2202.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. CINCINNATI—10133 Springfield Pike, Woodlawn, (513) 771-8850. CLEVELAND—28100 Chagrin Blvd., (216) 292-7553. COLUMBUS—2500 MORSE ROAD, (614) 475-7200. TOLEDO—48 S. Byrne Road, (419) 537-1887.

OKLAHOMA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. OKLAHOMA CITY—2727 Northwest Expressway, (405) 848-7593.

PENNSYLVANIA

PERSONAL SOFTWARE, 146 Paoli Pike, Paoli, 19355. (215) 296-2726. Software Specialists. Custom Programs, Canned Programs and Peripherals.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. PHILADELPHIA—6318 Roosevelt Ave., (215) 288-0180. FRAZER—630 Lancaster Pike, (Rt. 30), (215) 647-5555. PITTSBURGH—3482 Wm. Penn. Hwy., (412) 824-3564.

RHODE ISLAND

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. WARWICK—558 Greenwich Ave., (401) 738-5150.

TEXAS

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. DALLAS—2715 Ross Ave., (214) 826-4053. FORT WORTH—6825-A. Green Oaks Road, (817) 737-8822. HOUSTON—1704 W. Loop N., (713) 869-5263. NORTH HOUSTON—5050 FM 1960 West (713) 583-1163. SAN ANTONIO—7111 Blanco Road, (512) 341-8876.

UTAH

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. MIDVALE—58 East 7200 South, (801) 566-4626.

VIRGINIA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. ALEXANDRIA—6201 Richmond Hwy., (703) 765-5515. VIRGINIA BEACH—1055 Independence Blvd., (804) 460-0997.

WASHINGTON

COMPUTERS +, 2504 Jefferson Avenue, Tacoma, 98402. (206) 272-2329. Atari/Commodore Computers. Atari/Commodore/TRS-80 Software. Supplies.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. SEATTLE—505 8th Ave., North, (206) 682-2172. TUKWILA—15439 53rd Ave., South, (206) 246-5358. VANCOUVER—516 S.E. Chaklov Dr., (206) 254-4441.

CLASSIFIED AD HOTLINE:

Get the jump on competitors by using our Creative Computing Hotline number to place your classified ad and/or directory listing now for our next issue! We'll give you information on ad sizes, options, rates—everything you need to reach new customers easily and economically. It's like having fresh prospects right at your fingertips!

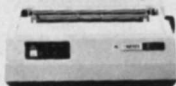
Classified Advertising
ZIFF-DAVIS PUBLISHING COMPANY
Consumer Computers & Electronics
Magazine Division

CALL 212-725-4215

the creative computer mart

SOFTWARE AND HARDWARE SHOPPERS GUIDE

OKIDATA



92A
160 CPS
DOT MATRIX
PRINTER

IN STOCK **\$439** LIMITED TIME ONLY

OKIDATA 93 - 850.00
WABASH DISK 165.00
per case of 100
ss/sd - 165.00 ss/dd 195.00
ss/dd - 275.00 verbatim
datalife - 245.00

DISK CONNECTION LTD. • 703 451-4100
6641 Backlick Rd.,
Springfield, VA 22150
KAYPRO, EAGLE,
OKIDATA, TRANSTAR
Choice Visa, Mastercard

CIRCLE 332 ON READER SERVICE CARD



Best Prices On TRS-80 Computers

Our 6th year of discounts
Ed or Joe McManus
Fgt. Prepaid. Save Tax.
Toll Free 800-231-3680

Marymac Industries, Inc.
22511 Katy Fwy., Katy
(Houston) Tx 77450
1-713-392-0747
Telex 774132

See us in the Wall Street
Journal every Tues. Wed. Thurs.

'NATIVE LINX'

means

never having to say you're sorry.
Lack of information and delays
costing you money?

Bisynchronous Communication
cuts your losses.
Simply connect your Apple II, II+,
or IIe to a 3270 or 2780/3780
mainframe. (Full IBM or RJE
functions available.)

TRANSMITS DOS DIRECT
VIKING ASSOCIATES INC.
320 West Fillmore Avenue
Colorado Springs,
Colorado 80907 (303) 632-7004
Telex: 450-711

TRS-80 MODEL 4 Word Processing Program



- Works with TRS80 6.0
- 90K TEXT BUFFER when expanded memory is installed
- Built-in FORM LETTER and MAIL-MERGE capabilities
- Performs PROPORTIONAL-SPACE right-margin justification on over 60 different printers (all drivers included FREE)
- Same powerful editing features as ZORLOF II, with dozens more features added
- Versions also available to run on MODEL I, MODEL III, LNW-80, PMC-80, and MAX-80 (80x24 display)

LeScript costs 1200 less than competing products matching its capabilities.
CALL 1-305-259-9397
ANITEK SOFTWARE PRODUCTS
P.O. BOX 361136
MELBOURNE, FL 32936
FREE SHIPPING WITHIN THE U.S.; OUTSIDE THE U.S. ADD \$10.00 FOR SHIPPING
FLORIDA RESIDENTS ADD 3% SALES TAX. ALL ORDERS PREPAID BY CHECK, MONEY ORDER, CREDIT CARD OR C.O.D.

Star Micronics Printer Sale

Delta 10	\$469.95
Delta 15	\$ CALL
Gemini 10X	\$269.95
Gemini 15X	\$399.95
Radix 10	\$695.00
Star STX-80	\$139.95

(below dealer cost)

Elephant Memory Systems Guaranteed Diskettes

5 1/4" SS/SD	\$ 16.95
5 1/4" SS/DD	\$ 18.95
5 1/4" DS/DD	\$ 27.95

Write for free Catalog
TEAM COMPUTER PRODUCTS
109 Church Street
New Haven, CT 06510
NATIONAL ORDER DESK
1-800-343-2325
TECHNICAL SUPPORT DEPT.
203-785-1606

CIRCLE 328 ON READER SERVICE CARD



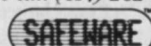
Sure it's insured?

SAFWARE™ Insurance provides full replacement of hardware, media and purchased software. As little as \$35/yr covers:
• Fire • Theft • Power Surges
• Earthquake • Water Damage • Auto Accident

For information or immediate coverage call:

1-800-848-3469

In Ohio call (614) 262-0559



SAFWARE, THE INSURANCE AGENCY INC.
CIRCLE 337 ON READER SERVICE CARD

APPLEWARE, INC.

The Apple Users Group's Software Library

For the first time enjoy your Apple to its fullest capacity, using specially packed disks with over 60 outstanding programs each (not available from any other source).

Each packed disk includes an extensive variety of interesting, useful and entertaining programs indispensable to all computerists! Mixed category packed disks include:
BUSINESS • EDUCATIONAL • DATA BASE • GAMES • UTILITIES • SCIENCE • MUSIC • GRAPHICS • FINANCE
Library Disk I, II and III are mixed categories. Single category disks are: GAMES • UTILITIES • GRAPHICS • INTEGER • SCIENCE • TECH • MUSIC & AUDIO
Individual disks available at \$59.95 each.
Order direct from this ad and save up to \$150. Buy Library Disks I, II and III and get a special bonus disk FREE - over 260 programs for \$179.95 + \$4 shipping. BUT for the Best Value, receive any 3 disks featuring over 600 of our best programs for only \$54 each for a package price of \$389. Certified Postage plus handling paid!

*Send one-time membership fee of \$15. (no fee charged to institutions) for 1000 + program catalog and gain access to a library of over 10,000 programs at a special 15% discount
(Foreign memberships \$28. U.S.)

For Orders Only Call now
TOLL FREE: 1-800-327-8864
Florida: 1-305-987-8865

Or Write:

Appleware, Inc.
6400 Hayes Street
Hollywood, Fla. 33024

Program Disks compatible with Apple II, II+, IIe, III Emul., Franklin Ace and IBM Quad



★MICROCOMPUTER★ BUSINESS SOFTWARE

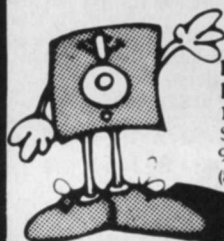
MEDICAL MGMT...
DENTAL MGMT...
INSURANCE AGENT
LEGAL BILLING.....
PROPERTY MGMT..
AND MUCH MORE !

UNIVAIR INTERNATIONAL
9024 St. Charles Rock Road
ST. LOUIS, MISSOURI 63114

(314) 426-1099



Solve your disc problems, buy 100% surface tested Dysan diskettes. All orders shipped from stock, within 24 hours. Call toll FREE (800) 235-4137 for prices and information. Visa and Master Card accepted.

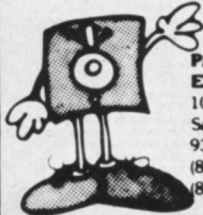


PACIFIC
EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401 (In Cal. call
(805) 543-1037)

CIRCLE 300 ON READER SERVICE CARD

MEMOREX FLEXIBLE DISCS

WE WILL NOT BE UNDER-
SOLD! Call Free (800)235-4137
for prices and information. Dealer
inquiries invited and COD's
accepted.



**PACIFIC
EXCHANGES**
100 Foothill Blvd
San Luis Obispo, CA
93401 In Cal call
(800)592-5935 or
(805)543-1037



CIRCLE 300 ON READER SERVICE CARD

TAPE WORLD

1-800-245-6000

maxell.

Dysan

MD-1	5 1/4" SSSD	21.95	104/10	5 1/4" SSSD	26.95
MD-20	5 1/4" DSSD	33.95	104/20	5 1/4" DSSD	36.95
FD-1	8" SSSD	34.95	3740/10	8" SSSD	36.95
FD-2	8" DSSD	39.95	3740/20	8" DSSD	49.95

IBM

TDK

3451	5 1/4" SSSD	24.95	2501	5 1/4" SSSD	21.95
3450	5 1/4" DSSD	29.95	2502	5 1/4" DSSD	33.95
ADD 1.00 FOR LIBRARY CASE			2801	8" SSSD	34.95
9550	8" SSSD	31.95	2809	8" DSSD	39.95
6872	8" DSSD	39.95			

WE WILL BEAT ANY PRICE!

Sold in cases of 10. Shipping 3.75 any size order.

Pre-paid, COD, or credit card. COD add 1.65.

Also, TDK and Maxell audio and video cassettes.

220 SPRING ST.
412-283-8621

BUTLER, PA 16001
M-F 8:30-5:00



Copy Atari 400/800/XL Series Cartridges to Disk
and run them from a Menu

ATARI CARTRIDGE-TO-DISK COPY SYSTEM \$69.95

Supercart lets you copy ANY cartridge for the Atari 400/800/XL Series to diskette, and thereafter run it from your disk drive. Enjoy the convenience of selecting your favorite games from a "menu screen" rather than swapping cartridges in and out of your computer. Each cartridge copied by Supercart functions exactly like the original.

Supercart includes:

- DISKETTE with: COPY PROGRAM - Copies the cartridge to a diskette (up to 9 cartridges will fit on one disk.) MENU PROGRAM - Automatically runs and displays a menu prompting user for a ONE keystroke selection of any cartridge on the disk.
- CARTRIDGE:

"Tracks" the computer into thinking that the original "copy protected" cartridge has been inserted.

To date there have been no problems duplicating and running all of the protected cartridges that we know of. However, FRONTRUNNER cannot guarantee the operation of all future cartridges.

Supercart is user-friendly and simple to use and requires no modifications of your hardware. PIRATES TAKE NOTE: SUPERCART is not intended for illegal copying and/or distribution of copyrighted software. . . Sorry!!!

SYSTEM REQUIREMENTS:

Atari 400/800 or XL Series Computer / 400K Memory / One Disk Drive Available at your computer store or direct from FRONTRUNNER.

DEALER INQUIRES ENCOURAGED.

TOLL FREE ORDER LINE: (24 Hrs.) 1-800-648-4780

In Nevada or for questions call: (702) 786-4600

Personal checks allow 2-3 weeks to clear. M/C and VISA accepted.

Include \$3.50 167.50 Foreign orders for shipping.

FRONTRUNNER COMPUTER INDUSTRIES

316 California Ave., Suite #712, Reno, Nevada 89509 - (702) 786-4600

Others Make Claims... SUPERCART makes copies!!!

ATARI is a trademark of Warner Communications, Inc.

Now available for the computer experimenter!

COMPUTER CONNOISSEUR'S DELIGHT!

ONLY \$6.00 EACH. ASSORTMENT OF SIX FOR \$26.50
OVER A THOUSAND COMPUTER PROGRAMS TOO MANY TO LIST
HERE. LEARN HOW TO RECEIVE VERY USEFUL PUBLIC DOMAIN
MATERIAL, SUCH AS "SHOW", "SWEEP", "DO", "LIB", "MODERN",
"O", "SORT", "MERGE", ETC. UNIQUE GAMES—VERSIONS OF
DONKEY KONG, SPACE INVADERS, ADVENTURE, STAR TREK, ETC.
—WILL ENHANCE SYSTEMS WITH UNSOPHISTICATED GRAPHIC
CAPABILITIES AND ALLOW YOU TO PLAY THEM ON ALMOST
ANY COMPUTER. MATHEMATICS, ASTRONOMY, ASTRONOMY TOO!

UNPUBLISHED
MATERIAL

WIT
COMICS

DIRECTORY
LISTING
NET-
WORKS

AC-
CESS
CODES

The one you've all
been waiting for

NOW AVAILABLE — Learn how to repair tele-
phones and telephone systems. How they work in
monthly installments with the
magazine for you.

Computel

PUBLISHED MONTHLY

ONE YEAR SUBSCRIPTION \$14.00
(SAMPLE COPY \$2.00)

COMPUTEL—the complete SOURCE for everyone.
You can now do the things you've only heard about,
right in the privacy of your own home. Indispensable
reference to phreaks and hackers. Learn how to get
all kinds of computer programs FREE. Get the inside
story of big business systems—their quirks and flaws
—and remain up to date with vital occurrences within
the computer industry. Computel is a publication de-
signed for everyone who has an intense curiosity of
computer systems, containing a wealth of hard to find
information, codes, and numbers. Published monthly.

161 Computel Publishing Society CPS
6354A VAN NUYS BLVD. / VAN NUYS, CA 91401

CIRCLE 325 ON READER SERVICE CARD

FREE!* THINK + PLUS EDUCATIONAL SOFTWARE

Developed by leading educators for
grades 1 — college, this drill and
practice software series contains
34 different programs including, 8
vocabulary and grammar, 16 math
and arithmetic, and 10 science
programs.

These packages run on the IBM
PC and PC compatibles, the new
Sanyo 550, Apple, TRS80, DEC
Rainbow and most CP/M 80 systems.

Please contact us for a complete
brochure on the THINK + PLUS
software series.

*Forward this ad and order form for 3 pack-
ages, get one free.

Resource Software International
330 New Brunswick Ave.
Fords, N.J. 08863
(201) 738-8500

ICs PROMPT DELIVERY!!! SAME DAY SHIPPING (USUALLY)

64K DYNAMIC RAM ICs

200 ns @ \$5.87

150 ns @ \$5.99

These are the ICs you need to
expand your IBM PC memory. In-
stall these yourself in the mother-
board or an expansion board. Our
prices are often half that of retail
stores. Our quality is second to
none.

We sell other memory ICs.
27128, 2764, 6264, 256K, etc.

MasterCard/VISA or UPS CASH COD

Factory New, Prime Parts

MICROPROCESSORS UNLIMITED

24,000 South Peoria Ave.

BEGGS, OK 74421

(918) 267-4961

Prices shown above are for March 15, 1984.
Please call for current & volume prices. Prices subject to change. Please expect higher
prices on some parts due to world wide shortages. Shipping and insurance extra. Cash
discount prices shown. Small orders received by 6 PM CST can usually be delivered to
you by the next morning, via Federal Express Standard Air or \$5.99.

EXPAND YOUR APPLE II/+e STORAGE

DISK MASTER II allows you to:

- Connect up to two 8" ds/dd including Shugart 801/851 series in all compatible drives
- Connect two 3 1/2" Sony drives
- Read standard 8" IBM compatible disks
- Drivers for all CPM Cards available

USING YOUR APPLE II/+e or Apple
Compatible Computer.

Affordably priced at \$285.00

Data Cue

5659 Highway 431 S.

Brownsboro, AL 35741

205-883-2933

HELLO ADVENTURER

Do you have an adventure that you
haven't been able to solve? Witt's Notes
are the answer! Witt's Notes are compre-
hensive booklets of hints and maps for
most adventures. Games like: Zork (I, II
or III), Starcross, Deadline, Suspended,
Witness, Enchanter, Planetfall, Infidel,
Colossal Cave, Quest, Transylvania,
Coveted Mirror, Mask of Sun, Serpent's
Star, Death in Caribbean, Blackpoole,
Kabul Spy, Mystery House, Wizard,
Cranston, Ulysses, Time Zone, Dark
Crystal and many more. Best of all, each
is only \$5.95. Quantity discounts avail-
able. Write for our free catalog which lists
other products including software, pos-
ters and more! Dealer inquiries invited.
CT residents add 7 1/2% sales tax.



WITT'S END

42 Morehouse Rd.

Easton, CT 06612

(203) 254-0728

wabash®

Flexible Diskettes

6 Year Warranty - 100% Certified

FREE DELIVERY

5 1/4" \$160 SINGLE SIDE DOUBLE DENSITY 48 TPI W/UB RING Packed 10 per Soft Pack	BULK SSSD \$140 SINGLE SIDE DOUBLE DENSITY 48 TPI W/UB RING Packed 10 per Soft Pack
5 1/4" \$189 SINGLE SIDE DOUBLE DENSITY 48 TPI W/UB RING Packed 10 per Soft Pack	BULK SSD \$170 SINGLE SIDE DOUBLE DENSITY 48 TPI W/UB RING Packed 10 per Soft Pack
5 1/4" \$247 DOUBLE SIDE DOUBLE DENSITY 48 TPI W/UB RING Packed 10 per Soft Pack	BULK DSSD \$225 DOUBLE SIDE DOUBLE DENSITY 48 TPI W/UB RING Packed 10 per Soft Pack

"Call for Quantity Prices"



TOLL
FREE
NAT'L
1-800-634-2248

We accept money orders, certified checks, VISA,
MasterCard and personal checks (take 10 days).
In N.D. add 4%.



Software Services®

1326 - 25th St. S., Suite H2

Fargo, ND 58103

1-701-280-0121

CIRCLE 343 ON READER SERVICE CARD

IBM
1/2 HEIGHT
DISK DRIVES \$189.00

TANDON
TM 100-2
5 1/4" Disk Drives \$209.00

- Shugart SA455 DS/DD 360 KB or Matsushita (same drive)

APPLE

COMPATIBLE 5 1/4 DISK DRIVES
\$189.00

- Utilizes Shugart SA390 Mechanism full one year replacement warranty

CALL TOLL FREE
1-800-227-3800 ext 456
for orders only

FOR INFO OR TECHNICAL ASSISTANCE
404-956-0903

WE SHIP C.O.D., CASHIER CHECK, OR
MONEY ORDER, VISA, MASTER CARD
ADD 4%

BULLDOG COMPUTER PRODUCTS
100 GALLERIA PKWY, STE 400
ATLANTA, GA 30339

ONLY \$19.95

Self-Centering



Full X-Y
Coordinate
Control

360°
Cursor
Control

2 Firing
Buttons

THE AMPOTRONIC SELF-CENTERING JOY STICK FOR APPLE COMPUTERS

Z-80 Card \$75.00
80 Column Card \$75.00
16K RAM Card \$45.00
Fan for Apple, 2 Power Outlets \$40.00
RF Module \$12.00
Computer Paper 15#,
3300 sheets 9 1/2"x11" \$26.95/box
Diskettes \$25.50/Case
Diskettes, SSDD, Generic, 10 Disks
in Library Case, \$22.50/Case

Include \$2.50 min. for shipping/handling.
NY State residents add sales tax.

Send check or money order to
AMPOC ENTERPRISES INC.
5 BEEKMAN ST. SUITE 720, NY 10038
(212) 233-1780
Dealer inquiries welcome

CAPTAIN MEGABYTE

4800 S.W. 48 ST. • FORT LAUDERDALE, FL 33314
SERVICE • QUALITY • PRICE



• PRINTER RIBBONS
• STORAGE BOXES
• HEAD CLEAN KITS

BUY IN QUANTITIES
AND SAVE MONEY!

10 DISKS 5 1/4" DS/DD	10 DISKS 5 1/4" DS/DD	10 DISKS 5 1/4" DS/DD
Shugart SA455 \$189.00	Shugart SA455 \$189.00	Shugart SA455 \$189.00
Shugart SA390 \$189.00	Shugart SA390 \$189.00	Shugart SA390 \$189.00
Shugart SA390 \$189.00	Shugart SA390 \$189.00	Shugart SA390 \$189.00
Shugart SA390 \$189.00	Shugart SA390 \$189.00	Shugart SA390 \$189.00
Shugart SA390 \$189.00	Shugart SA390 \$189.00	Shugart SA390 \$189.00
Shugart SA390 \$189.00	Shugart SA390 \$189.00	Shugart SA390 \$189.00
Shugart SA390 \$189.00	Shugart SA390 \$189.00	Shugart SA390 \$189.00
Shugart SA390 \$189.00	Shugart SA390 \$189.00	Shugart SA390 \$189.00
Shugart SA390 \$189.00	Shugart SA390 \$189.00	Shugart SA390 \$189.00

LOW PRICE-HIGH QUALITY PRODUCTS FOR PC's

MAXELL 5 1/4" SS/DD - 23.90
DS/DD - 35.90
DYSAN 5 1/4" SS/DD - 29.90
DS/DD - 39.90
CALL
IBM D-BASE II - 397.
MICROSOFT WORD - 249.
WORD/MOUSE - 309.
CYMA SOFTWARE - CALL
SUPER CALC 3 - 229.
R:BASE 4000 - 329.
SMARTMODEM 1200B - 439.
SMARTMODEM 1200 - 499.
WORD STAR PRO PACK - 389.
LOTUS 123 - 329.
AST SIXPAK PLUS 64K - 269.

WE CARRY A COMPLETE LINE OF PRODUCTS.
CALL FOR OUR FREE COMPUTER CATALOG.

DATA BASE CO.
9778 Katella Ave. #106
Anaheim, CA. 92804
(714) 534-8140



CALL CREDITED TO ORDER.
CA. RESIDENTS ADD 6% TAX

ADD 2%
SHIPPING
\$5. MINIMUM

Seeing is Believing!

Take 10 days, with full refund privileges, to see how the remarkable LINEMINDER™ Guide LC-8 can save you thousands of dollars in time and effort.

- The fastest, easiest, most accurate way to input (and edit) computer programs, data, statistics, text, mailing and phone lists, prices, and more.
- For use on page widths up to 9 1/2 inches.
- **ONLY \$3.95** plus \$1.00 shipping and handling.
- Full refund if not 100% satisfied.
- Send check or money order. No COD. N.J. residents add 6% tax. U.S. only.

H L ENTERPRISES
22 Ellsworth Ave., C 74 Morristown NJ 07960

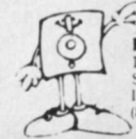


Maxell Floppy Disks

The Mini-Disks
with maximum quality.



Dealer inquiries
invited C.O.D's
accepted Call
FREE (800) 235-4137



PACIFIC EXCHANGES
100 Foothill Blvd. San Luis
San Luis Obispo, CA 93401
In Cal. call (800) 592-5935 or
(805) 543-1037

CIRCLE 300 ON READER SERVICE CARD

Scotch Diskettes

Rely on Scotch® diskettes to keep your valuable data safe. Dependable Scotch diskettes are tested and guaranteed error-free. The low abrasivity saves your read/write heads. They're compatible with most diskette drives.



(800)235-4137

PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401. In Cal. Call
(800) 592-5935 or
(805) 543-1037.

Dealer Inquiries
Invited

CIRCLE 300 ON READER SERVICE CARD

At last you can own THE PROGRAMMER'S SECRET WEAPON —

"LEE'S GUIDE TO PUBLISHED
MICROCOMPUTER PROGRAMS. 1st Ed."
By Henry Lee, Ph.D.

An exhaustive index to over 8000 BASIC programs and 300 Assembly programs from 160 books and 500 magazines 1979-1983. 2 Vols. All program descriptions listed by source, and cross-indexed 1 to 3 times by subject. Hundreds of programs on finances, education, math, engineering, games, and graphics. Plus where to obtain over 1600 agricultural, business, educational, and home programs free or almost-free.

"...an indispensable work for all serious computer users, programmers and teachers."

PASADENA TECHNOLOGY PRESS
Dept. CC
1444 Santa Anita Ave.
P. O. Box 3836
South El Monte, Calif. 91733

Price: \$27 plus \$2.00 handling and postage.
California residents please add \$1.96 sales tax.

CIRCLE 347 ON READER SERVICE CARD

SALES POWER

Creative Computing not only sells itself at a nice profit, it helps sell the hardware and software in your store too. Because it goes home with customers and continues to influence buying decisions long after you're closed for the day. Let's talk now.

CALL COLLECT:
(212) 725-7679

Or write:
Ziff-Davis Publishing
One Park Avenue
New York, NY 10016

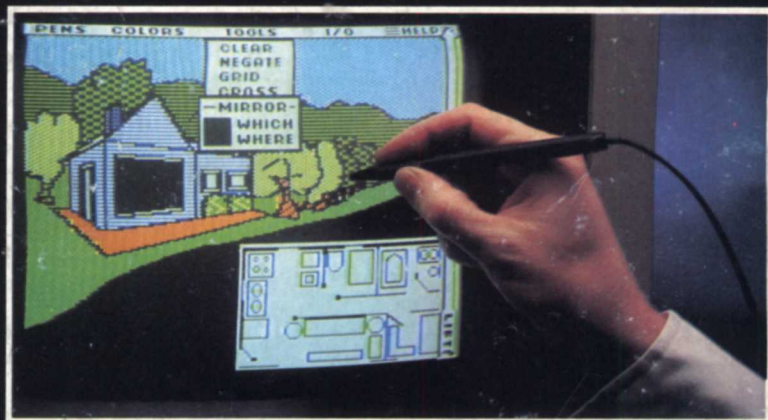


Minimum order, 10 copies. We pay all shipping costs.

Index To Advertisers

Reader Service No.	Advertiser	Page	Reader Service No.	Advertiser	Page	Reader Service No.	Advertiser	Page
101	Aardvark	193	129	Hayes	10, 11	153	Panasonic	180
*	Accent Software	21	150	Hayes	118	159	Precision Data Products	58
102	Actrix	151	131	Heath	213	160	Precision Software	26
*	Alf	65	187	Heath	Cover 4	157	Prentice Hall	15
196	Allenbach Industries	133	132	Houston Instruments	137	156	Prometheus Products	106
105	Amtype Corporation	200						
*	Apple	122, 123	133	IBM	49-52	154	Quark	161
112	Attaché Software	59	135	Indus	153	161	Quinsept	200
			134	Infax	55			
107	BASF	47	136	Infocom	154, 155	186	Radio Shack	162, 163
108	Baudville	212	137	Inmac	212	163	Reston	171
188	Beagle Brothers	186				168	Ring King	25
109	Borland International	1	184	Jandel	217	165	Rolland	205
			185	Jandel	219			
						166	Sakata	29
111	CBS Software	69-80	138	Kangaroo	58	167	H. Sams	144
183	CBS Software	138, 139	140	Kensington Microware	117	164	Sattellite Software	127
106	Commodore	185	139	Koala	Cover 3	169	Southern California Research	
113	Compuserve	41	191	Koala	124	Group		169
114	Compuserve	188, 189				170	Sentinal	66
115	Computer Discount Products	149	141	Lewis Lee Corp.	109	171	Sierra On-Line	62
117	Computer Line	156	143	Lycu Computing	198, 199	*	Spinnaker	23
116	Computer Mail Order	130, 131				174	Sublogic	45
120	Conroy-La Point	98, 99	*	Mac Millin Books	113-115	173	SWP	101
121	Cosmic Computer	197	145	Micro Lab	5			
			146	Micro Management Systems	197	176	Tecmar	Cover 2
123	Dennison	9	147	Millenium Software	105	178	Tecmar	2
*	Digital Equipment Corp.	60, 61				179	Tecmar	7
182	Disc Washer	134	*	NEBS	208	*	Texas Instruments	177
			148	NEC	121	*	Texas Instruments	36, 37
*	Electronic Arts	56	190	NEC	143	177	Thoughtware	190, 191
124	Electronic Specialist	132	149	Nibblenotch	160	172	U.S. Robotics	17
125	Epyx	35	130	Nonagon	164			
						175	Videx	214
127	Gemini	33	151	Okidata	172	180	Votrax	97
128	Gentech	203	152	Omega	128	181	Xerox	103

Now...Draw On Your Imagination



Introducing The Gibson Light Pen System.™

The link between mind and machine has arrived. Suddenly you're free...free to translate your every thought into professional quality computer graphics... just by touching your screen.

The Gibson Light Pen System software features *icon* menus that offer easy access to powerful graphics tools such as symbol libraries, geometric shapes, mirror-imaging, magnification and complete color and pattern editing. Even if you're not a graphic artist, you can design, diagram and draw with precision at high-speed, in high-resolution, and in full-color...right on your screen.

COMPLETE WITH FIVE SOFTWARE SYSTEMS TO MAXIMIZE YOUR CREATIVE OPTIONS.

The Gibson Light Pen System comes complete with all you need to draw, paint, design, score music and learn animation.

DRAW FREE HAND WITH PENPAINTER™

A full range of drawing tools, colors and pens and colors to draw or paint virtually anything on your screen.

DESIGN PRECISION DIAGRAMS WITH PENDING™

Turn your computer into your own graphic design studio. A complete selection of templates make perfect business and architectural diagrams, technical drawings and engineering schematics a snap.

CREATE COMPUTERIZED ANIMATION WITH PENANIMATOR™

All that you need to learn the basics of animation. Develop your own animation sequences, and bring your screen to life.

COMPOSE MUSIC WITH PENMUSICIAN™

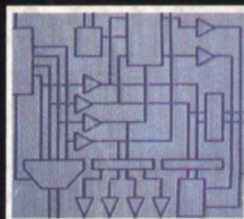
Score computerized melodies with incredible ease at the touch of your pen.

CREATE YOUR OWN LIGHT PEN APPLICATIONS WITH THE PENTRAK LANGUAGE SYSTEM™

Take advantage of the software features, and customize your own light pen programs.

NOW AVAILABLE FOR THE APPLE II® SERIES

Coming soon for the IBM PC® and PCjr.™



The Gibson Light Pen System

Touch the Magic of Light

CIRCLE 139 ON READER SERVICE CARD



Koala Technologies
800-KOA-BEAR

Build your own IBM PC compatible and save hundreds of dollars.



Heath proudly announces the NEW HS-151 Desktop and HS-161 Portable computers.

One of the world's largest software libraries has IBM's name on it. Now you can run that software on Heath's new IBM PC compatible computers, available in easy-to-build kits.

Can you build one of these computers? 85% of our first-time customers ask the same question. And the answer is 100% yes. You can.

In fact, you *should* build one. You'll save a lot of money while learning about computers in general and the Heath PC's in particular.

Build confidence...and your new computer...one step at a time. Two main circuit boards come to you pre-assembled and factory-tested. So that you can build the three other boards, we include a test soldering board plus helpful soldering instructions to make sure you get it right.

Our instruction manuals are easy to understand, thorough and packed with cogent illustrations. And once it's built, the computer guides you

through a full range of included disk-based diagnostics.

Expert advice is only a phone call away, should you need it. You'll reach a trained consultant whose specialty is talking sense, not jargon.

We'll do whatever's necessary to make our pledge come true: "We Won't Let You Fail." Our entire business depends on that simple promise.

Experience a little wonder and a lot of pride. Save money, too, by building the highest quality personal computer. The Heath PC's have 128K RAM standard (expandable to 640K), a professional keyboard, dual 360K disk drives and optional Winchester. These machines are truly complete. Both are color capable and MS-DOS is included.

Check out the Heath PC computers today. IBM compatibility means they'll run the most popular software. And, with the money saved by building a kit, think of all the peripherals and software you can buy!

HS-151 Desktop PC with standard floppy disk drive or optional hard disk.

CIRCLE READER SERVICE CARD. Get more information on the most rewarding personal computers. The HS-151 Desktop PC and HS-161 Portable PC.

*MS is a registered trademark of Microsoft Corporation.

For computing on the go... the HS-161 Portable.



The HS-161 has the same features as the HS-151. Amber Monitor included. Convenient keyboard folds up, two disk drives fold down.



Heathkit®
Heath
Company